

Workshop Manual

Audi A6 2011 ➤
Audi A6 Avant 2011 ➤

Electrical system, hybrid

Engine ID	CHJA								
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Edition 03.2014



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List of Workshop Manual Repair Groups

Repair Group

00 - Technical data

93 - Electric drive systems



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Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.

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00 – Technical data

1 Safety precautions

(ARL003756; Edition 03.2014)

⇒ "1.1 Safety precautions when working on vehicles with start/stop system", page 1

⇒ "1.2 Safety precautions when using testers and measuring instruments during a road test", page 1

1.1 Safety precautions when working on vehicles with start/stop system

Note the following when working on vehicles with start/stop system:



WARNING

Risk of injury due to automatic engine start on vehicles with start/stop system.

- ◆ *On vehicles with activated start/stop system (this is indicated by a message in the instrument cluster display), the engine may start automatically on demand.*
- ◆ *Therefore it is important to ensure that the start/stop system is deactivated when performing repairs (switch off ignition, if required switch on ignition again).*

1.2 Safety precautions when using testers and measuring instruments during a road test

Please note the following points if testers and measuring instruments have to be used while test driving the vehicle:



WARNING

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Risk of accident due to driver distraction and if test equipment is not secured safely.

Risk of injury if front passenger's airbag is triggered in an accident.

- *Operating test equipment when driving causes a distraction.*
- *High risk of injury if test equipment is not secured safely.*
- ◆ *Always secure test equipment to rear seat with a strap; it must be operated from there by a second person.*

2 Repair notes

⇒ "2.1 Contact corrosion", page 2

⇒ "2.2 Routing and securing wiring", page 2

2.1 Contact corrosion

Contact corrosion can occur if unsuitable fasteners (bolts, nuts, washers, etc.) are used.

For this reason, only fasteners with a special surface coating are fitted.

Furthermore, rubber components or plastic components and adhesives are made of non-conductive material.

Always fit new components if you are not sure that the old components are suitable ⇒ Electronic parts catalogue .

Note:

- ◆ We recommend the use of genuine replacement parts only; they have been tested and are compatible with aluminium.
- ◆ We recommend using Audi Genuine Accessories.
- ◆ Damage resulting from contact corrosion is not covered by warranty.

2.2 Routing and securing wiring

- ◆ To prevent mix-ups and to ensure that all components are re-installed in their original installation positions, mark for example fuel lines, hydraulic lines, vacuum lines, activated charcoal filter system or electrical wiring before removing them. Where necessary, make sketches or take photographs.
 - ◆ Because of the limited space in the engine compartment, it is important to ensure that there is **adequate clearance to any moving or hot components to avoid damage to lines and wiring.**
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93 – Electric drive systems

1 General warning instructions for work on the high-voltage system



Note

In the event of queries or uncertainty regarding the terms "electrically instructed person", "Audi high-voltage technician", "Audi specialist for work on high-voltage systems" or the high-voltage system itself, the relevant importer must be contacted prior to the start of all work.

The system must first be de-energised before any work is done on the high-voltage system [⇒ page 9](#).

For work that requires de-energising of the high-voltage system, please note:

The high-voltage system must be de-energised according to the "Guided Fault Finding" routine in the ⇒ Vehicle diagnostic tester, and ONLY by this method.



DANGER!

High voltage can cause fatal injury

Danger of severe or fatal injuries from electric shock

- ◆ *The high-voltage system may only be de-energised by a suitably qualified person (Audi high-voltage technician).*
- ◆ *It must be definitely confirmed that the high-voltage system is de-energised. The system may only be de-energised using the vehicle diagnostic tester via "Guided Fault Finding".*
- ◆ *The qualified person (Audi high-voltage technician) confirms that the system is de-energised and uses the locking cap - T40262 - to ensure that the system cannot be re-energised. The ignition key and the maintenance connector for high-voltage system - TW - are then stored in a safe place by the qualified person.*
- ◆ *The qualified person (Audi high-voltage technician) marks the vehicle by attaching the appropriate warning signs.*

For re-energising the system:

The high-voltage system must be re-energised according to the "Guided Fault Finding" routine in the ⇒ Vehicle diagnostic tester, and ONLY by this method.



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- ◆ *The system may only be re-energised using the vehicle diagnostic tester via "Guided Fault Finding".*
- ◆ *The vehicle is then made ready for operation again by the qualified person (Audi high-voltage technician).*
- ◆ *The qualified person (Audi high-voltage technician) marks the vehicle by attaching the appropriate warning signs.*

For work in the vicinity of high-voltage components:



DANGER!

Risk of fatal injury if high-voltage components are damaged.

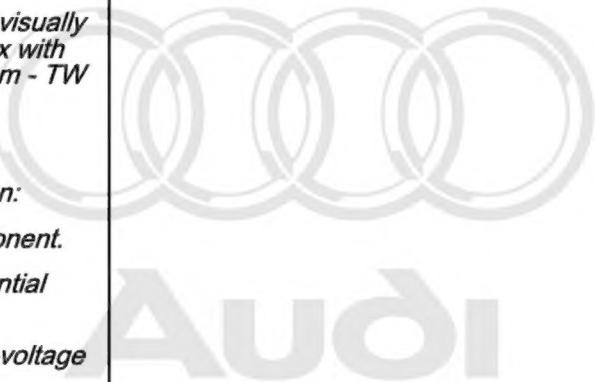
Observe the following when working in the vicinity of high-voltage components or wiring:

- ◆ *It is not permitted to use cutting or forming tools, other sharp-edged tools or heat sources such as welding, brazing, soldering, hot air or thermal bonding equipment.*
- ◆ *Before starting work, visually inspect the high-voltage components in the areas involved.*
- ◆ *Before working in engine compartment, visually inspect power and control electronics for electric drive - JX1-, electric drive motor - V141-, air conditioner compressor - V470- and high-voltage wiring.*
- ◆ *Before working on the vehicle underbody, visually inspect the high-voltage wiring and covers.*
- ◆ *Before working on the rear section of the vehicle, visually inspect the high-voltage wiring and the electro-box with the maintenance connector for high-voltage system - TW - .*
- ◆ *Visually inspect all potential equalisation lines.*

Check the following when making the visual inspection:

- ◆ *There must be no external damage on any component.*
- ◆ *The insulation of the high-voltage wiring and potential equalisation lines must not be damaged.*
- ◆ *There must be no unusual deformation of the high-voltage wiring.*
- ◆ *All high-voltage components must be identified by a red warning sticker.*

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For work that requires the ignition to be switched on, please note:



DANGER!

When working on a vehicle with the ignition switched on or while the drive system is active, the engine can start unexpectedly and exhaust fumes can cause a health hazard in closed rooms. Moving parts can trap or draw in parts of the body and/or clothing (safety hazard).

Before switching on the ignition, perform the following steps:

- ◆ *Move selector lever to position P*
- ◆ *Activate parking brake*
- ◆ *Switch off ignition*
- ◆ *Open bonnet*
- ◆ *Connect battery charger (e.g. - VAS 5095A-) to jump-start connections of 12 V electrical system*
- ◆ *Switch on ignition*

For general warnings and for work that requires the ignition not to be switched on, please note:



WARNING

Safety hazard: the engine can start unexpectedly.

Before carrying out general work on a vehicle with high-voltage electrical system, switch off the ignition and remove the ignition key from the vehicle.

General notes:



WARNING

Working on vehicles with high-voltage wiring:

- *Do not support yourself or tools on high-voltage wiring or associated components --> this can damage the insulation.*
- *High-voltage wiring must not be excessively bent or kinked --> this can damage the insulation.*
- *The round high-voltage connectors are colour-coded with an external coloured ring and are provided with mechanical coding or guide lugs. It is important to observe this coding when joining up the round high-voltage connectors, otherwise the connectors can be damaged.*

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Identification/coding of high-voltage wiring [⇒ page 36](#) .

 Note

- ◆ The contact surfaces of the potential equalisation lines must be checked prior to installation.
- ◆ The contact surfaces must be clean and free from rust and grease.
- ◆ Otherwise, repair the contact surfaces using the contact surface cleaning set - VAS 6410- ⇒ Electrical system; General information; Rep. gr. 97; Cleaning contact surfaces with contact surface cleaning set - VAS 6410- .

Explanation of the relevant qualifications

See: Basic information on high-voltage vehicles ⇒ **Basic information on high-voltage vehicles; Rep. gr. 00: Qualification of internal/external personnel**

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Working with the system de-energised

Assembly group	Repair group	Work	Reason
Air conditioner	87	Air duct directly on hybrid battery unit - AX1-	Air duct can only be removed if hybrid battery unit - AX1- is removed
Air conditioner	87	High-pressure refrigerant line to inner heat exchanger (IWT)	Accessibility because of routing behind power and control electronics for electric drive - JX1- .
Air conditioner	87	Detach electrical air conditioner compressor - V470-	High-voltage component
Air conditioner	87	Remove electrical air conditioner compressor - V470-	High-voltage component
Engine	10	Remove and install engine	Electrical air conditioner compressor - V470- must be removed
Engine	13	Remove bracket for ancillaries	Electrical air conditioner compressor - V470- must be removed
Gearbox	37	Remove and install gearbox	High-voltage component, high-voltage connection on connection box
Brake	47	Remove and install brake servo	Refrigerant line and high-voltage component must be removed
Brake hydraulics	47	Remove and install vacuum pump for brake servo	Refrigerant line and high-voltage component must be removed
Brakes - ABS	45	Remove and install ESP control unit and hydraulic unit	High-voltage component must be removed
General body repairs, exterior	50	Work on plenum chamber partition panel (removal and installation)	Contact with high-voltage components and wires
Welding work	50, 51, 53		
Body repairs (with straightening jig)	50, 51, 53		
Power and control electronics for electric drive - JX1-	93	Work on component, removing and installing	High-voltage component
High-voltage wiring harness for drive motor - PX2-	93	Work on component, removing and installing	High-voltage component
High-voltage wiring harness for hybrid battery - PX1-	93	Work on component, removing and installing	High-voltage component

Assembly group	Repair group	Work	Reason
Hybrid battery unit - AX1-	93	Work on component, removing and installing	High-voltage component
Electrical air conditioner compressor - V470-	93	Work on component, removing and installing	High-voltage component
High-voltage wire for electrical air conditioner compressor - P3-	93	Work on component, removing and installing	High-voltage component
Electric drive motor - V141-	93	Work on component, removing and installing	High-voltage component

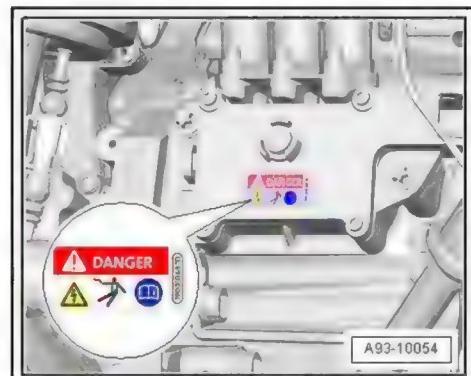
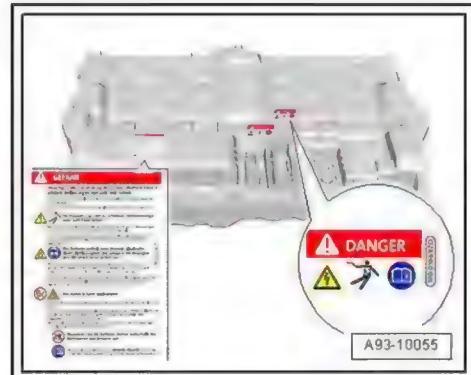
1.1 Warning labels

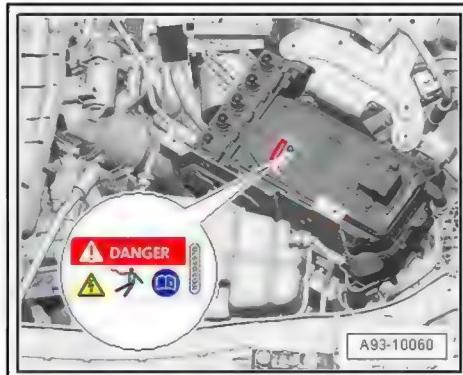
A warning label is attached to all high-voltage components.

When performing maintenance work, ensure that these labels do not become damaged or dirty and that they are attached to all high-voltage components.

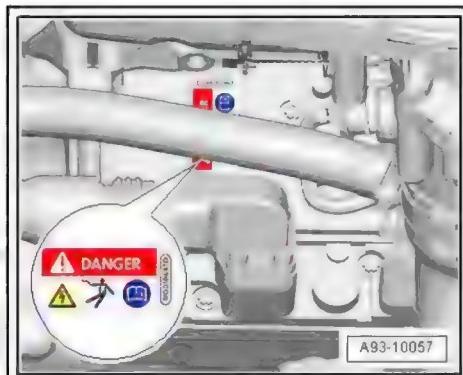
There are warning labels on:

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- ◆ Lock carrier (yellow warning label)
- ◆ Hybrid battery unit - AX1- (red warning label and battery warning label)
- ◆ Electric drive motor - V141- (red warning label)
- ◆ Power and control electronics for electric drive - JX1- (red warning label)
- ◆ Electrical air conditioner compressor - V470- (red warning label)



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2 De-energising high-voltage system

The high-voltage system must be de-energised according to the "Guided Fault Finding" routine in the ⇒ Vehicle diagnostic tester, and ONLY by this method.



DANGER!

High voltage can cause fatal injury

Danger of severe or fatal injuries from electric shock

- ◆ *The high-voltage system may only be de-energised by a suitably qualified person (Audi high-voltage technician).*
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 - ◆ *The qualified person (Audi high-voltage technician) confirms that the system is de-energised and uses the locking cap - T40262- to ensure that the system cannot be re-energised. The ignition key and the maintenance connector for high-voltage system - TW - are then stored in a safe place by the qualified person.*
 - ◆ *The qualified person (Audi high-voltage technician) marks the vehicle by attaching the appropriate warning signs.*



Note

- ◆ *De-energising high-voltage system:*
 - ◆ *Connect vehicle diagnostic tester*
 - ◆ *Select Guided Fault Finding mode*
 - ◆ *Using the Go to button, select the following menu options in succession:*
 - ◆ **Function/component selection**
 - ◆ **Body**
 - ◆ **Electrical system**
 - ◆ **Self-diagnosis-compatible systems**
 - ◆ **8C – Hybrid battery management -J840**
 - ◆ **8C – Hybrid battery management, functions**
 - ◆ **51 – De-energise high-voltage system (Rep. gr. 93)**

3 Re-energising high-voltage system

The high-voltage system must be re-energised according to the "Guided Fault Finding" routine in the ➤ Vehicle diagnostic tester, and ONLY by this method.



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- ◆ *The system may only be re-energised using the vehicle diagnostic tester via "Guided Fault Finding".*
- ◆ *The vehicle is then made ready for operation again by the qualified person (Audi high-voltage technician).*
- ◆ *The qualified person (Audi high-voltage technician) marks the vehicle by attaching the appropriate warning signs.*



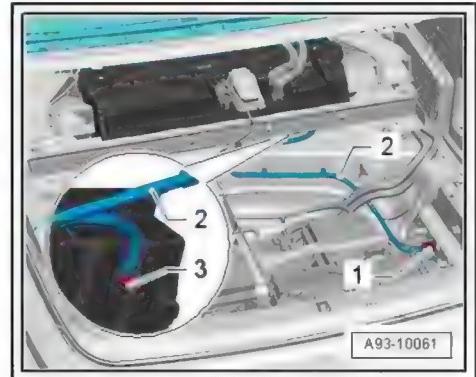
Note

- ◆ *Re-energising high-voltage system:*
- ◆ *Connect vehicle diagnostic tester*
- ◆ *Select Guided Fault Finding mode*
- ◆ *Using the Go to button, select the following menu options in succession:*
- ◆ *Function/component selection*
- ◆ *Body*
- ◆ *Electrical system*
- ◆ *Self-diagnosis-compatible systems*
- ◆ *8C – Hybrid battery management –J840*
- ◆ *8C – Hybrid battery management, functions*
- ◆ *51 – Re-energise high-voltage system (Rep. gr. 93)*

4 Potential equalisation lines



- ◆ The contact surfaces of the potential equalisation line must be checked prior to installation.
- ◆ The contact surfaces must be clean and free from rust and grease.
- ◆ Otherwise, repair the contact surfaces using the contact surface cleaning set - VAS 6410- ⇒ Electrical system; General information; Rep. gr. 97 ; Cleaning contact surfaces with contact surface cleaning set - VAS 6410- .



Potential equalisation line on hybrid battery unit - AX1- -2-

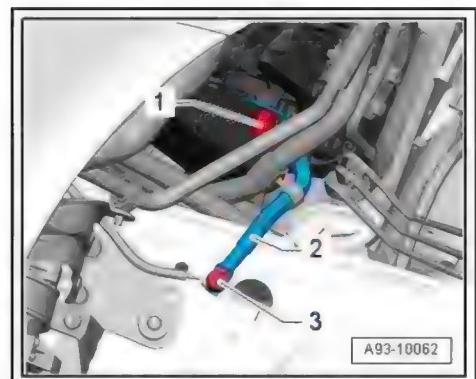
Tightening torque for nut on base of battery -3-: 9 Nm

Tightening torque for nut on body -1-: 18 Nm

Potential equalisation line on power and control electronics for electric drive - JX1- -2-

Tightening torque for nut on power and control electronics for electric drive - JX1- -1-: 18 Nm

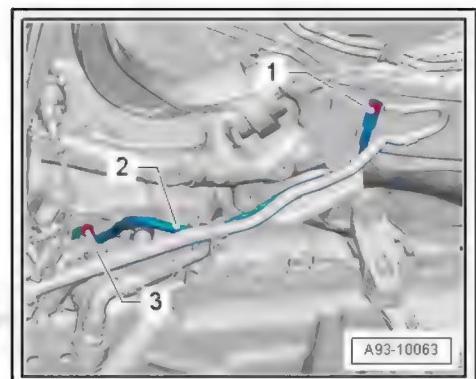
Tightening torque for bolt on body -3-: 9 Nm



Potential equalisation line -2- on electric drive motor - V141-

Tightening torque for bolt -1- on body: 20 Nm

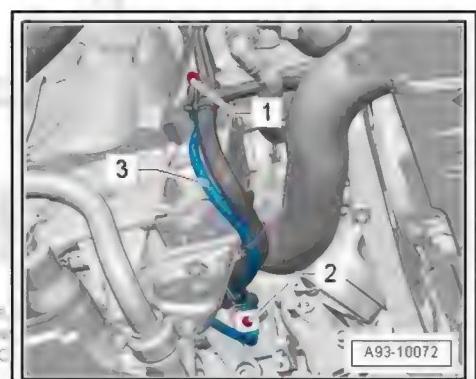
Tightening torque for bolt -3-: 20 Nm



Potential equalisation line for electrical air conditioner compressor - V470- -3-

Tightening torque for nut on longitudinal member -1-: 20 Nm

Tightening torque for nut on engine support -2-: 20 Nm



5 General description of high-voltage technology

5.1 Overview of high-voltage components

General description

The most important components of the A6 high-voltage system are the electric drive motor - V141-, the hybrid battery unit - AX1-, the high-voltage wiring and the power and control electronics for electric drive - JX1-. The power and control electronics for electric drive contain the electric drive control unit - J841^{led}, the voltage converter - A19- and the DC/AC converter for drive motor - A37-

Further components include the electrical air conditioner compressor - V470- , the low-temperature cooling system, the cooling module for the hybrid battery unit - AX1- and the disengagement clutch in the electric drive motor - V141- .

1 - Combustion engine

- ⇒ 4-cylinder direct petrol injection engine (2.0 ltr. 4-valve turbo, hybrid); Rep. gr.

2 - High-voltage wire for electrical air conditioner compressor - P3-

- Coding of high-voltage connection - red coloured ring
 - Removing and installing
⇒ page 49

3 - Power and control electronics for electric drive - JX1-

- Electric drive control unit - J841-
 - Voltage converter - A19-
 - DC/AC converter for drive motor - A37-
 - Red warning label
⇒ [page 8](#)
 - Coding of high-voltage connections
⇒ [page 38](#)
 - Removing and installing
⇒ [page 27](#)

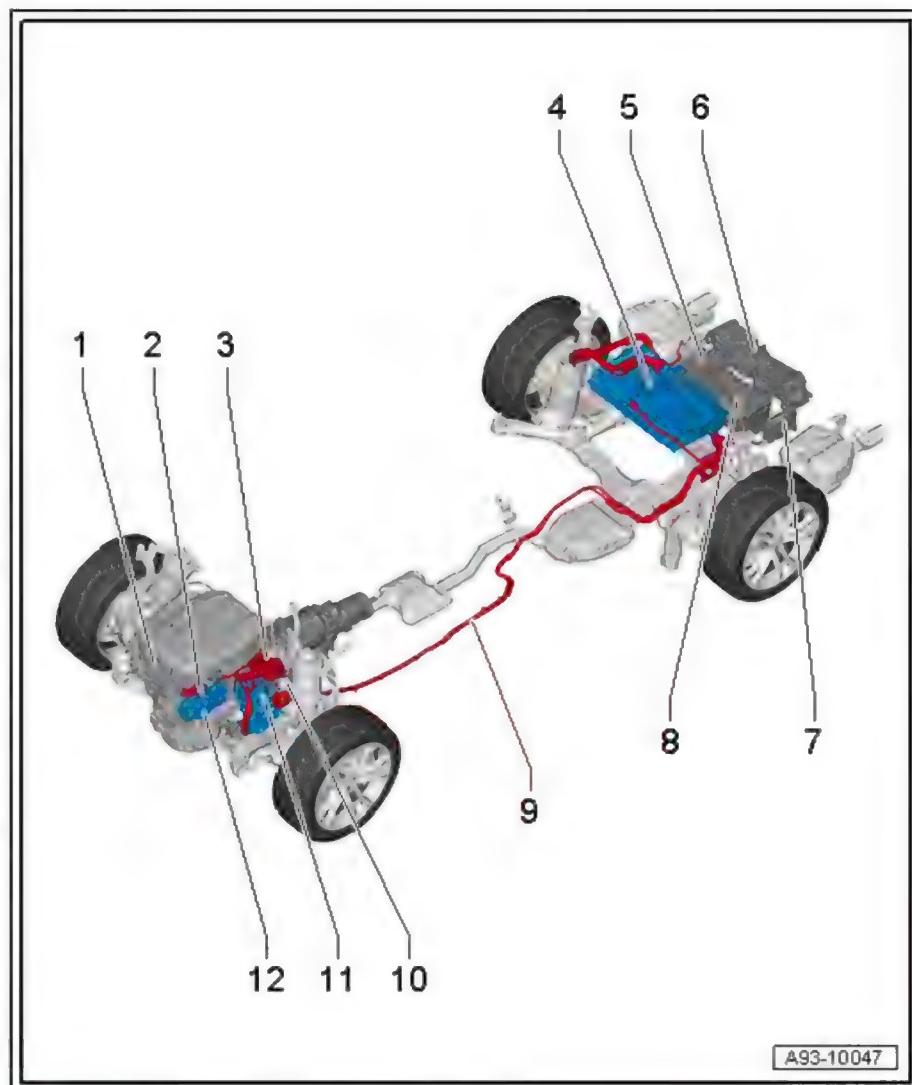
4 - Hybrid battery unit - AX1-

- Red warning label and battery warning label
⇒ [page 8](#)
 - Coding of high-voltage connections
⇒ [page 37](#)
 - Removing and installing ⇒ [page 19](#)
 - Maintenance connector for high-voltage system - TW- ⇒ [page 13](#)

12 11 10

5 - Air supply duct for cooling hybrid battery unit - AX1-

- Removing and installing ⇒ Heating, air conditioning: Rep. qr. 87



6 - Cooling module for hybrid battery unit - AX1-

- ⇒ Heating, air conditioning; Rep. gr. 87

7 - Wiring junction - TV1- for high-voltage system

- ⇒ Current flow diagrams, Electrical fault finding and Fitting locations

8 - Air supply duct for cooling hybrid battery unit - AX1-

- Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87

9 - High-voltage wiring harness for hybrid battery - PX1-

- High-voltage wire for hybrid battery, positive terminal - P1- red coloured ring
- High-voltage wire for hybrid battery, negative terminal - P2- brown coloured ring
- Coding of high-voltage connections on hybrid battery unit - AX1- [⇒ page 37](#)
- Coding of high-voltage connections on power and control electronics for electric drive - JX1- [⇒ page 38](#)
- Removing and installing [⇒ page 38](#)

10 - High-voltage wiring harness for drive motor - PX2-

- High-voltage wire 1 for drive motor - P4- (U) blue coloured ring/coding lug on right side
- High-voltage wire 2 for drive motor - P5- (V) green coloured ring/coding lug on left side
- High-voltage wire 3 for drive motor - P6- (W) violet coloured ring/two coding lugs
- Coding of high-voltage connections on power and control electronics for electric drive - JX1- [⇒ page 38](#)
- Coding of high-voltage connections on electric drive motor - V141- [⇒ page 38](#)
- Removing and installing [⇒ page 43](#)

11 - Electric drive motor - V141-

- Red warning label [⇒ page 8](#)
- Coding of high-voltage connections [⇒ page 38](#)
- Removing and installing [⇒ page 14](#)

12 - Electrical air conditioner compressor - V470-

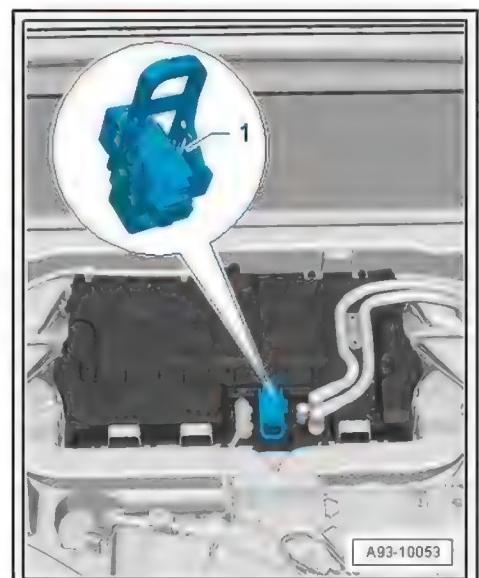
- Red warning label [⇒ page 8](#)
- Coding of high-voltage connection: red coloured ring
- Notes [⇒ page 53](#)

5.2 Maintenance connector for high-voltage system - TW-

The maintenance connector for high-voltage system - TW- -1- is an electrical bridge between the two battery banks of the hybrid battery unit - AX1- .

When the maintenance connector for high-voltage system - TW- is unplugged, the link between the battery banks is disconnected and the remaining voltage in the high-voltage system dissipates. The system is de-energised at this point.

The maintenance connector for high-voltage system - TW- is always unplugged if the high-voltage system needs to be de-energised [⇒ page 9](#) .



6 Components specific to high-voltage system

6.1 Electric drive motor - V141-

6.1.1 General description

The electric drive motor - V141- -1- is located between the combustion engine and the gearbox.

It acts directly on the gearbox input shaft and has the following functions:

- ◆ A drive motor to propel the vehicle with electric power only
- ◆ A generator to supply the electrical system with power and charge the hybrid battery unit - AX1- .
- ◆ A starter to start the combustion engine.

The disengagement clutch in the electric drive motor - V141- cannot be renewed separately; there is no provision for opening and dismantling the electric drive motor - V141- .

Potential equalisation line on electric drive motor - V141-
[⇒ page 11](#).

6.1.2 Removing and installing electric drive motor - V141-



WARNING

Working on vehicles with high-voltage wiring:

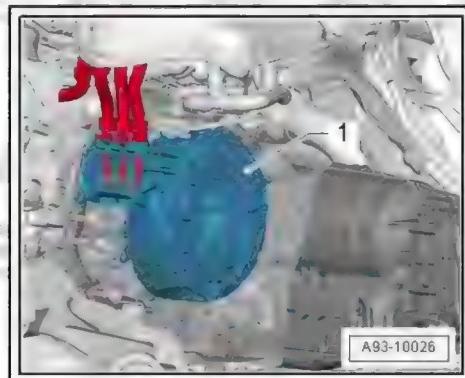
- *Do not support yourself or tools on high-voltage wiring or associated components --> this can damage the insulation.*
- *High-voltage wiring must not be excessively bent or kinked --> this can damage the insulation.*
- *The round high-voltage connectors are colour-coded with an external coloured ring and are provided with mechanical coding or guide lugs. It is important to observe this coding when joining up the round high-voltage connectors, otherwise the connectors can be damaged.*

Removing

The electric drive motor - V141- is a component of the gearbox, so the gearbox first has to be removed.

- De-energise high-voltage system.

The high-voltage system must be de-energised according to the "Guided Fault Finding" routine in the ⇒ Vehicle diagnostic tester, and ONLY by this method.



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DANGER!

High voltage can cause fatal injury

Danger of severe or fatal injuries from electric shock

- ◆ *The high-voltage system may only be de-energised by a suitably qualified person (Audi high-voltage technician).*
- ◆ *It must be definitely confirmed that the high-voltage system is de-energised. The system may only be de-energised using the vehicle diagnostic tester via "Guided Fault Finding".*
- ◆ *The qualified person (Audi high-voltage technician) confirms that the system is de-energised and uses the locking cap - T40262- to ensure that the system cannot be re-energised. The ignition key and the maintenance connector for high-voltage system - TW - are then stored in a safe place by the qualified person.*
- ◆ *The qualified person (Audi high-voltage technician) marks the vehicle by attaching the appropriate warning signs.*

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Note

- ◆ *De-energising high-voltage system:*
- ◆ *Connect vehicle diagnostic tester*
- ◆ *Select Guided Fault Finding mode*
- ◆ *Using the Go to button, select the following menu options in succession:*
- ◆ *Function/component selection*
- ◆ *Body*
- ◆ *Electrical system*
- ◆ *Self-diagnosis-compatible systems*
- ◆ *8C - Hybrid battery management -J840*
- ◆ *8C - Hybrid battery management, functions*
- ◆ *51 - De-energise high-voltage system (Rep. gr. 93)*

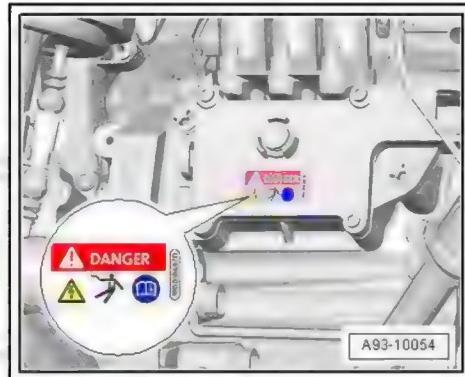
- Take care not to damage the red warning label on the housing cover of the high-voltage connections.

First remove high-voltage wires on electric drive motor - V141-
[⇒ page 43](#).

- Remove electric drive motor - V141- ⇒ 8-speed automatic gearbox 0BW (hybrid, front-wheel drive); Rep. gr. 38 ; Electric drive motor - V141- ; removing and installing electric drive motor - V141- .

Installing

- Remove electric drive motor - V141- ⇒ 8-speed automatic gearbox 0BW (hybrid, front-wheel drive); Rep. gr. 38 ; Electric drive motor - V141- ; removing and installing electric drive motor - V141- .



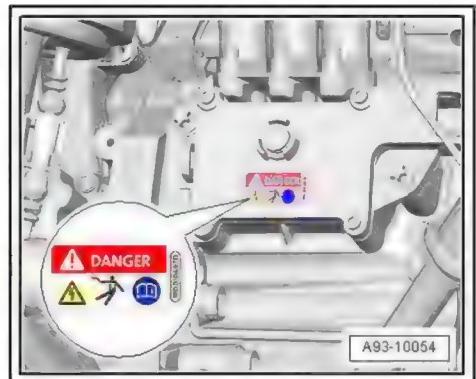
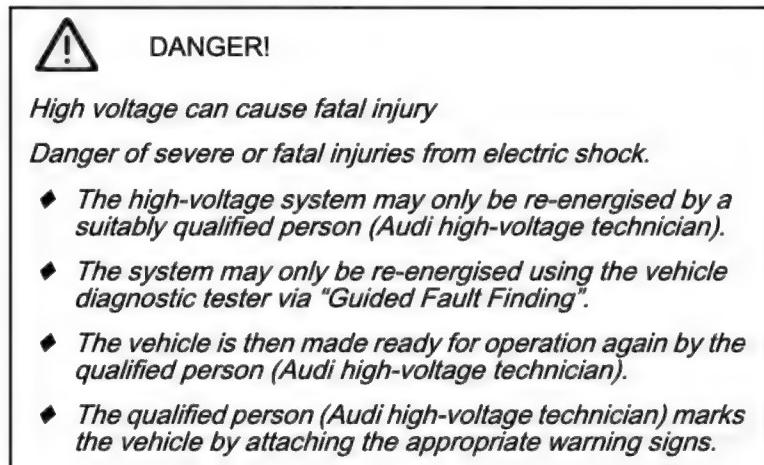
WARNING

Working on vehicles with high-voltage wiring:

- **Do not support yourself or tools on high-voltage wiring or associated components --> this can damage the insulation.**
- **High-voltage wiring must not be excessively bent or kinked --> this can damage the insulation.**
- **The round high-voltage connectors are colour-coded with an external coloured ring and are provided with mechanical coding or guide lugs. It is important to observe this coding when joining up the round high-voltage connectors, otherwise the connectors can be damaged.**

- Take care not to damage the red warning label on the housing cover of the high-voltage connections.
- Connect high-voltage wires according to their coding
⇒ [page 43](#).
- Re-energise high-voltage system.

The high-voltage system must be re-energised according to the "Guided Fault Finding" routine in the ⇒ Vehicle diagnostic tester, and ONLY by this method.



Note

- ◆ *Re-energising high-voltage system:*
- ◆ *Connect vehicle diagnostic tester*
- ◆ *Select **Guided Fault Finding** mode*
- ◆ *Using the **Go to** button, select the following menu options in succession:*
- ◆ **Function/component selection**
- ◆ **Body**
- ◆ **Electrical system**
- ◆ **Self-diagnosis-compatible systems**
- ◆ **8C – Hybrid battery management –J840**
- ◆ **8C – Hybrid battery management, functions**
- ◆ **51 – Re-energise high-voltage system (Rep. gr. 93)**

6.2 Hybrid battery unit - AX1-

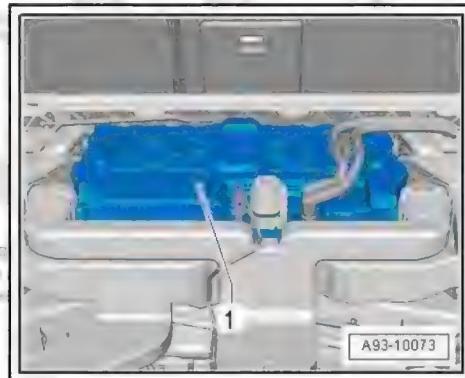
6.2.1 General description

The hybrid battery unit - AX1-1- provides the electric drive motor - V141- with the necessary high voltage to enable the vehicle to be driven with electric power only.

The hybrid battery unit - AX1- consists of the hybrid battery - A38- with 72 lithium-ion cells, the battery regulation control unit - J840-, the maintenance connector for high-voltage system - TW- and pilot line connector 1 - TV44-. The hybrid battery unit - AX1- has a total voltage of 266 V. To protect the hybrid battery unit - AX1-, particularly in a rear crash, it is surrounded by a frame consisting of welded and bolted aluminium profiles. This frame directs impact energy into the vehicle structure.

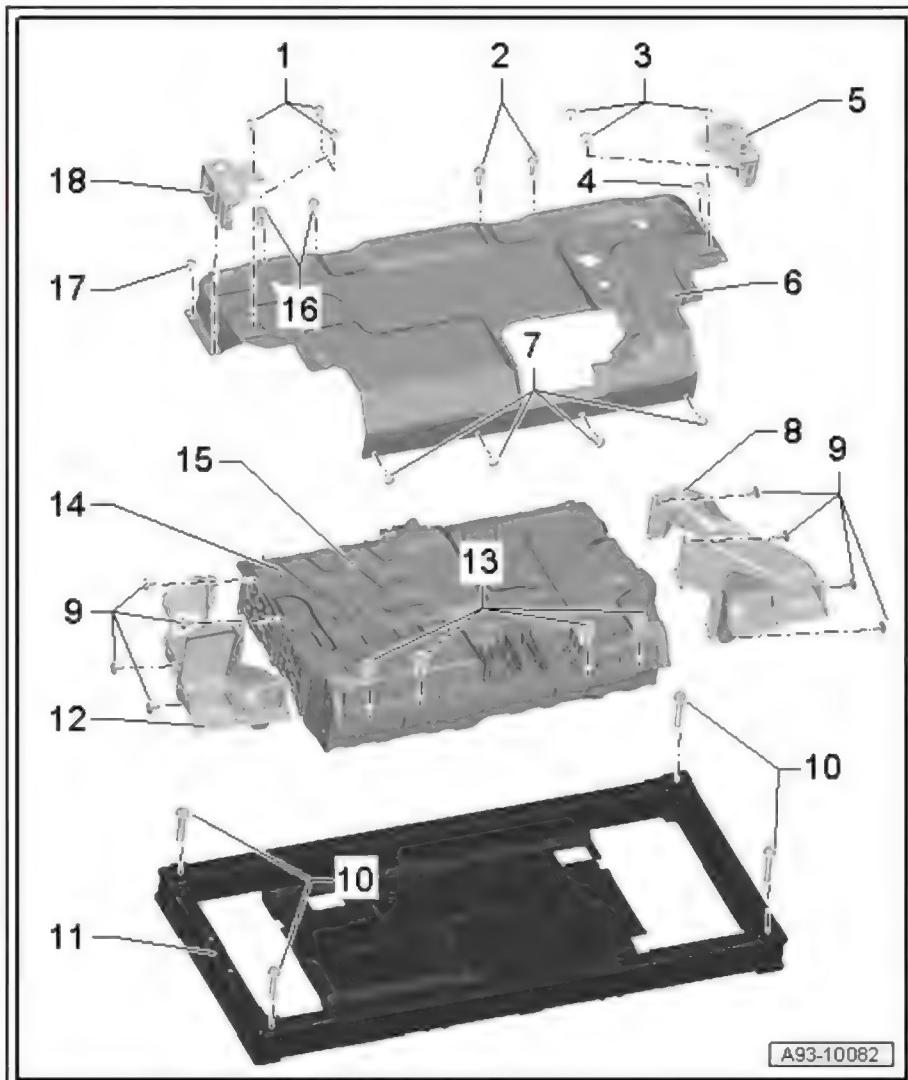
The cooling module for the hybrid battery unit - AX1- can be removed and renewed; there is no provision for opening and dismantling the hybrid battery unit - AX1- itself.

Potential equalisation line on hybrid battery unit - AX1-
[⇒ page 11](#)



6.2.2 Exploded view - hybrid battery unit - AX1-

- 1 - Bolt
 - 10 Nm
- 2 - Bolt
 - 20 Nm
- 3 - Bolt
 - 10 Nm
- 4 - Bolt
 - 10 Nm
- 5 - Bracket for fastening ring
- 6 - Cover
- 7 - Bolt
 - 10 Nm
- 8 - Air duct (right-side)
- 9 - Bolt
 - 2 Nm
- 10 - Bolt
 - 46 Nm
- 11 - Bracket
- 12 - Air duct (left-side)
- 13 - Bolt
 - 20 Nm
- 14 - Hybrid battery unit - AX1-
 - Removing and installing
[⇒ page 19](#)



- 15 - Cover
- 16 - Bolt
 - 20 Nm
- 17 - Bolt
 - 10 Nm
- 18 - Bracket for fastening ring

6.2.3 Removing and installing hybrid battery unit - AX1-



WARNING

Danger of physical injury and material damage

Check hybrid battery unit - AX1- for:

- ◆ *Cracks in battery housing or battery box*
- ◆ *Deformations of battery housing or battery box*
- ◆ *Temperature-induced discolourations and heat tinting on housing*
Prevention of fire hazard! If any of the above faults are detected, do not proceed with the removal of the hybrid battery unit. A fault in the hybrid battery unit may pose a danger to the environment and personal safety.
- ◆ *Strong smell (escaping electrolyte)*

If you detect any of the faults listed above, the high-voltage battery must be classified ⇒ Basic information on high-voltage vehicles; Rep. gr. 00 ; Lithium-ion high-voltage battery; Classification of a lithium-ion high-voltage battery.

Special tools and workshop equipment required

- ◆ Torque wrench - V.A.G 1331-

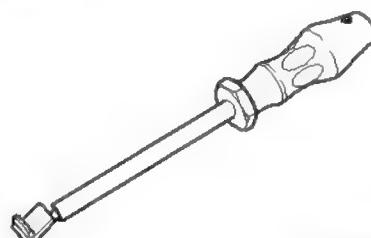
V.A.G 1331



W00-0427

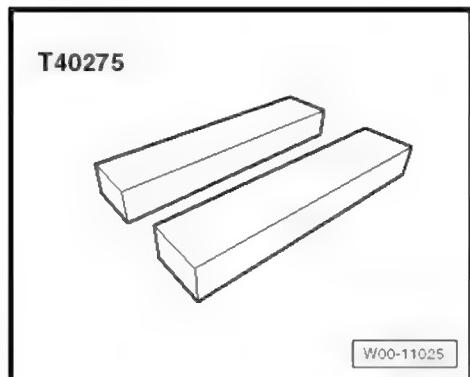
- ◆ Release tool - T40258-

T40258



W00-10980

◆ Rails - T40275-



Removing



WARNING

Working on vehicles with high-voltage wiring:

- *Do not support yourself or tools on high-voltage wiring or associated components --> this can damage the insulation.*
- *High-voltage wiring must not be excessively bent or kinked --> this can damage the insulation.*
- *The round high-voltage connectors are colour-coded with an external coloured ring and are provided with mechanical coding or guide lugs. It is important to observe this coding when joining up the round high-voltage connectors, otherwise the connectors can be damaged.*

– De-energise high-voltage system.

The high-voltage system must be de-energised according to the "Guided Fault Finding" routine in the ⇒ Vehicle diagnostic tester, and ONLY by this method.



DANGER!

High voltage can cause fatal injury

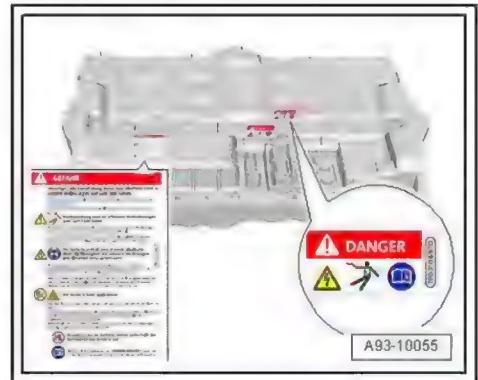
Danger of severe or fatal injuries from electric shock

- ◆ *The high-voltage system may only be de-energised by a suitably qualified person (Audi high-voltage technician).*
- ◆ *It must be definitely confirmed that the high-voltage system is de-energised. The system may only be de-energised using the vehicle diagnostic tester via "Guided Fault Finding".*
- ◆ *The qualified person (Audi high-voltage technician) confirms that the system is de-energised and uses the locking cap - T40262- to ensure that the system cannot be re-energised. The ignition key and the maintenance connector for high-voltage system - TW - are then stored in a safe place by the qualified person.*
- ◆ *The qualified person (Audi high-voltage technician) marks the vehicle by attaching the appropriate warning signs.*

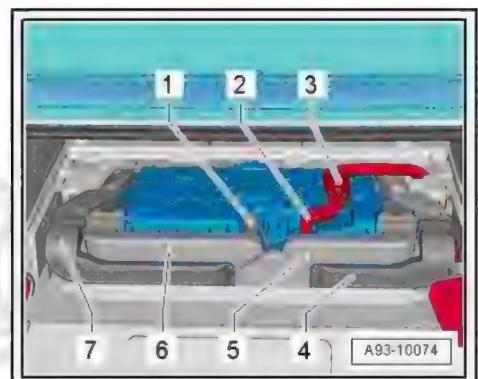


Note

- ◆ *De-energising high-voltage system:*
 - ◆ *Connect vehicle diagnostic tester*
 - ◆ *Select Guided Fault Finding mode*
 - ◆ *Using the Go to button, select the following menu options in succession:*
 - ◆ ***Function/component selection***
 - ◆ ***Body***
 - ◆ ***Electrical system***
 - ◆ ***Self-diagnosis-compatible systems***
 - ◆ ***8C - Hybrid battery management -J840***
 - ◆ ***8C - Hybrid battery management, functions***
 - ◆ ***51 - De-energise high-voltage system (Rep. gr. 93)***
- Remove luggage compartment floor covering ⇒ General body repairs, interior; Rep. gr. 70 ; Removing and installing luggage compartment floor covering .
- Take care not to damage the red warning label and the battery warning label.



- Unplug connectors to battery cooling module -1-.
- Pull off cover over high-voltage wires.
- Release and unplug connectors -2- for high-voltage wire for hybrid battery, positive terminal - P1- and high-voltage wire for hybrid battery, negative terminal - P2- .

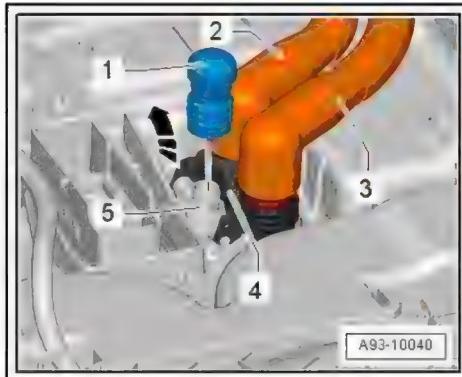


- First pull out pilot line connector 1 - TV44- -1- then fold up retaining clip -4- in direction of -arrow-.
- Release and disconnect high-voltage wire for hybrid battery, positive terminal - P1- -3- and high-voltage wire for hybrid battery, negative terminal - P2- -2- using release tool - T40258- .

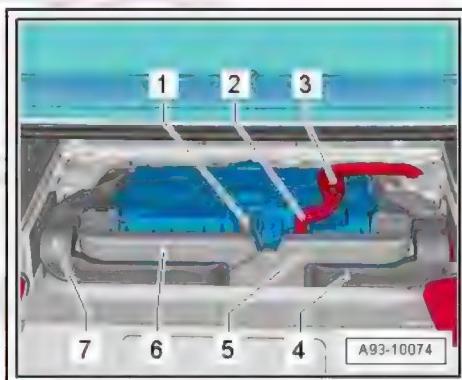


Caution

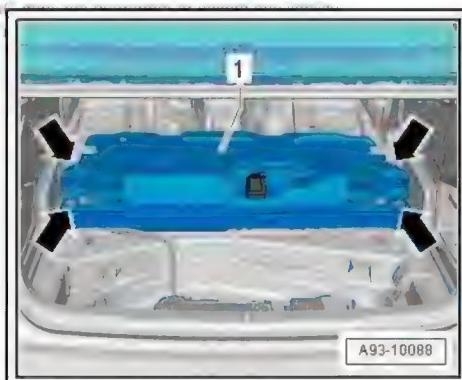
Only unplug high-voltage connectors by pulling them upwards. Do NOT rotate or tilt them; this could damage the coding on the high-voltage wires.



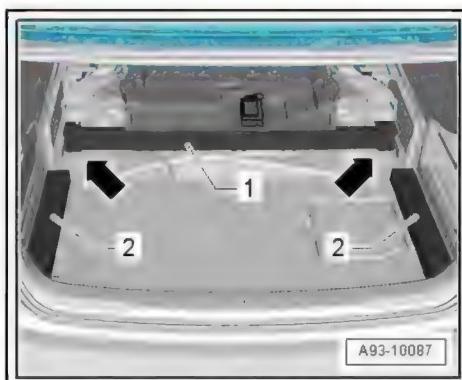
- Pull high-voltage wiring harness for hybrid battery - PX1- -2- out of wiring clip -3- and move to side.
- Remove air ducts -4- to -7-.
- Unbolt potential equalisation line on body [⇒ page 11](#) and set down on hybrid battery unit - AX1- .



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- Remove bolts -arrows- on bracket for hybrid battery unit - AX1- -1-.
 - Re-insert rear luggage compartment floor.



- Place rails - T40275- -2- in luggage compartment on both sides.
- Lift hybrid battery unit - AX1- with bracket -1- over two bolt heads -arrows- and set down towards rear on rails - T40275- -2-.

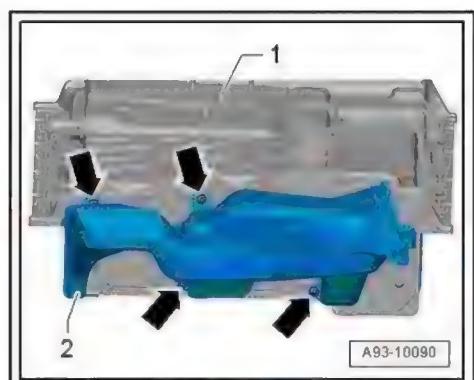


- With assistance from a second mechanic, take hold of the hybrid battery unit - AX1- -1- on both sides -arrows- and lift it out of luggage compartment.
- Remove potential equalisation line on hybrid battery unit - AX1- [⇒ page 11](#).
- Set down hybrid battery unit - AX1- on a suitable surface.

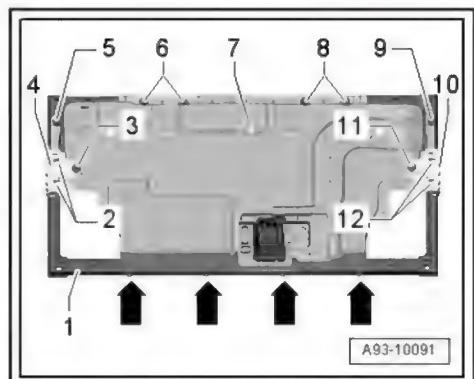


- Remove air ducts -2- -arrows-.

Removing cover and bracket:



- Remove bolts -2-, -3-, -11- and -12-.
- Remove brackets for fastening rings -4- and -10-.
- Remove bolts -5-, -6-, -8-, -9- and -arrows-.
- Remove cover -7- from hybrid battery unit - AX1- .



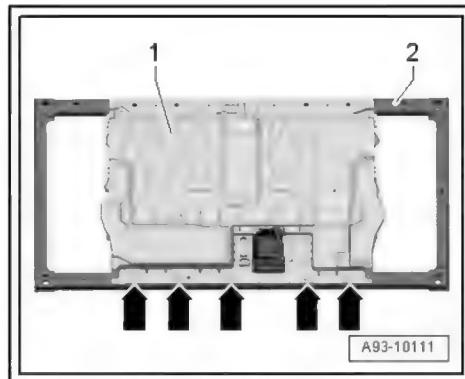
- Remove bolts -arrows- and take hybrid battery unit - AX1-
-1- off bracket -2-.



Caution

Danger of physical injury and material damage

Observe notes on storing and transporting the lithium-ion high-voltage battery ⇒ Basic information on high-voltage vehicles; Rep. gr. 00 ; Lithium-ion high-voltage battery; Storing and transporting the lithium-ion high-voltage battery .



Installing

Install in reverse order. Please note the following:

Tightening torques [⇒ page 18](#)



WARNING

Working on vehicles with high-voltage wiring:

- *Do not support yourself or tools on high-voltage wiring or associated components --> this can damage the insulation.*
- *High-voltage wiring must not be excessively bent or kinked --> this can damage the insulation.*
- *The round high-voltage connectors are colour-coded with an external coloured ring and are provided with mechanical coding or guide lugs. It is important to observe this coding when joining up the round high-voltage connectors, otherwise the connectors can be damaged.*

Protective clothing (e.g. leather jacket, leather trousers) must be worn when working on the high-voltage system. Audi A6 Avant 2011 ➤, Audi A6 2011 ➤

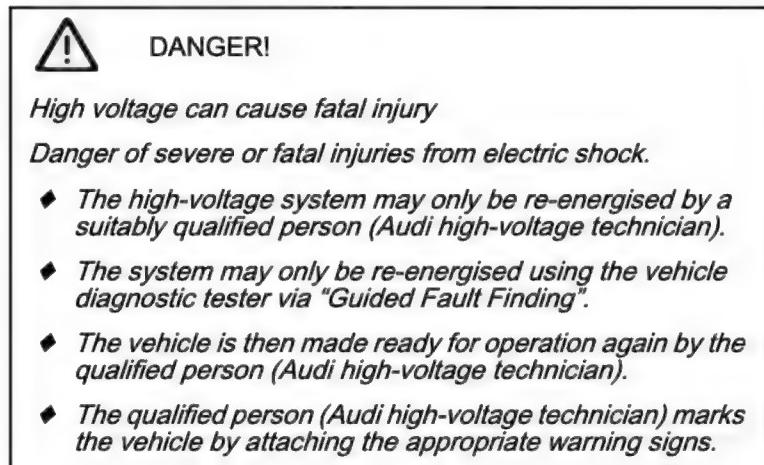


Note

- ◆ *When fitting hybrid battery unit - AX1- in vehicle, make sure that no lines or connectors are trapped beneath hybrid battery unit - AX1- .*
- ◆ *The contact surfaces of the potential equalisation line must be checked prior to installation.*
- ◆ *The contact surfaces must be clean and free from rust and grease.*
- ◆ *Otherwise, repair the contact surfaces using the contact surface cleaning set - VAS 6410- ⇒ Electrical system; General information; Rep. gr. 97 ; Cleaning contact surfaces with contact surface cleaning set - VAS 6410- .*
- Connect high-voltage wires according to their coding
[⇒ page 38](#) .

- Check that the red warning label and the battery warning label are present and that they do not become damaged.
- Install luggage compartment floor covering ⇒ General body repairs, interior; Rep. gr. 70 .
- Re-energise high-voltage system.

The high-voltage system must be re-energised according to the "Guided Fault Finding" routine in the ⇒ Vehicle diagnostic tester, and ONLY by this method.



Note

- ◆ *Re-energising high-voltage system:*
- ◆ *Connect vehicle diagnostic tester*
- ◆ *Select **Guided Fault Finding** mode*
- ◆ *Using the **Go to** button, select the following menu options in succession:*
- ◆ **Function/component selection**
- ◆ **Body**
- ◆ **Electrical system**
- ◆ **Self-diagnosis-compatible systems**
- ◆ **8C - Hybrid battery management -J840**
- ◆ **8C - Hybrid battery management, functions**
- ◆ **51 - Re-energise high-voltage system (Rep. gr. 93)**

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6.3 Power and control electronics for electric drive - JX1-

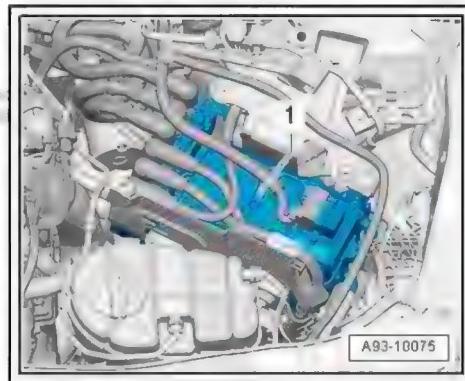
6.3.1 General description

The power and control electronics for electric drive - JX1- act as the link between the electric drive motor - V141- and the hybrid battery unit - AX1-. It contains the electric drive control unit - J841-, the voltage converter - A19-, the intermediate circuit capacitor 1 - C25- and the DC/AC converter for drive motor - A37- .

For driving with the electric drive motor - V141-, the DC/AC converter for drive motor - A37- converts the 266 V direct current of the hybrid battery unit - AX1- into 360 V alternating current. The voltage converter - A19- converts high voltage into low voltage to supply the 12 V electrical system. Power and control electronics for electric drive - JX1- are water-cooled and are installed in engine compartment (front left).

The following high-voltage wires are connected to the power and control electronics for electric drive - JX1- :

- ◆ High-voltage wire for hybrid battery, positive terminal - P1- to hybrid battery unit - AX1- [⇒ page 38](#)
- ◆ High-voltage wire for hybrid battery, negative terminal - P2- to hybrid battery unit - AX1- [⇒ page 38](#)
- ◆ High-voltage wire 1 for drive motor - P4- to electric drive motor - V141- [⇒ page 43](#) .
- ◆ High-voltage wire 2 for drive motor - P5- to electric drive motor - V141- [⇒ page 43](#) .
- ◆ High-voltage wire 3 for drive motor - P6- to electric drive motor - V141- [⇒ page 43](#) .
- ◆ High-voltage wire for electrical air conditioner compressor - P3- to electrical air conditioner compressor - V470- [⇒ page 49](#) .



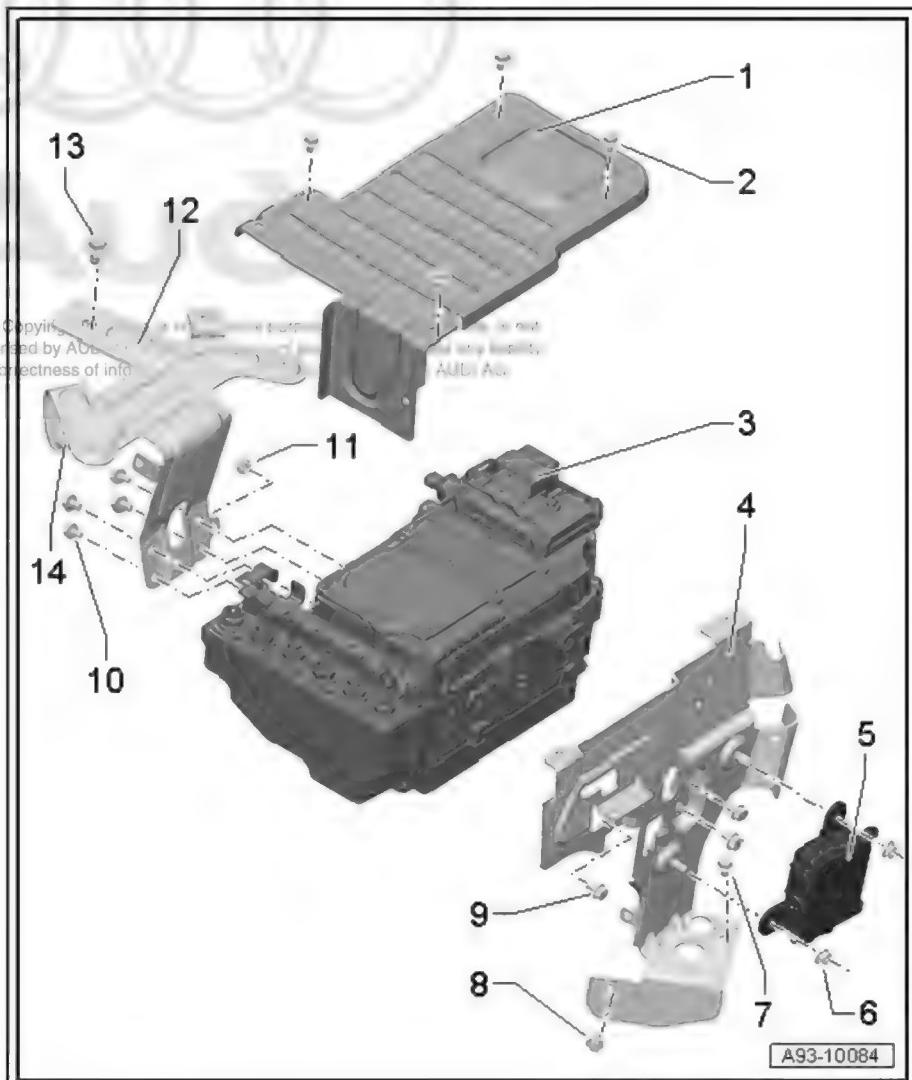
Note

- ◆ *Fuse for electrical air conditioner compressor - JX1- is integrated into power and control electronics for electric drive - V470-.*
- ◆ *Fuse cannot be renewed. Power and control electronics for electric drive - JX1- cannot be dismantled any further. If damaged, renew power and control electronics for electric drive - JX1-.*

Potential equalisation line on power and control electronics for electric drive - JX1- [⇒ page 11](#) .

6.3.2 Overview

- 1 - Cover
- 2 - Bolt (4x)
 - 8 Nm
- 3 - Power and control electronics for electric drive - JX1-
 - Removing and installing
[⇒ page 27](#)
- 4 - Bracket (front)
- 5 - Terminal 30 wiring junction
- 2 - TV22-
- 6 - Nut (2x)
 - 4 Nm
- 7 - Bolt
 - 50 Nm
- 8 - Bolt
 - 50 Nm
- 9 - Bolt (3x)
 - 8 Nm
- 10 - Bolt (4x)
 - 8 Nm
- 11 - Bolt
 - 8 Nm
- 12 - Bracket (rear)
- 13 - Bolt
 - 50 Nm



6.3.3 Removing and installing power and control electronics for electric drive - JX1-



WARNING

Working on vehicles with high-voltage wiring:

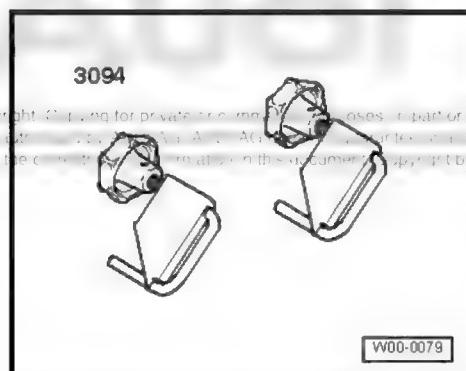
- *Do not support yourself or tools on high-voltage wiring or associated components --> this can damage the insulation.*
- *High-voltage wiring must not be excessively bent or kinked --> this can damage the insulation.*
- *The round high-voltage connectors are colour-coded with an external coloured ring and are provided with mechanical coding or guide lugs. It is important to observe this coding when joining up the round high-voltage connectors, otherwise the connectors can be damaged.*

Special tools and workshop equipment required

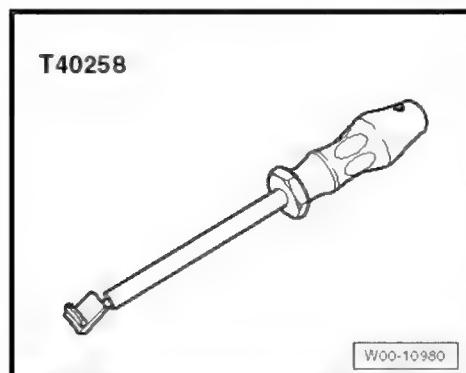
◆ Torque wrench - V.A.G 1331-



◆ Hose clamps up to 25 mm - 3094-



◆ Release tool - T40258-



Removing

- De-energise high-voltage system.

The high-voltage system must be de-energised according to the "Guided Fault Finding" routine in the ⇒ Vehicle diagnostic tester, and ONLY by this method.



DANGER!

High voltage can cause fatal injury

Danger of severe or fatal injuries from electric shock

- ◆ The high-voltage system may only be de-energised by a suitably qualified person (Audi high-voltage technician).
- ◆ It must be definitely confirmed that the high-voltage system is de-energised. The system may only be de-energised using the vehicle diagnostic tester via "Guided Fault Finding".
- ◆ The qualified person (Audi high-voltage technician) confirms that the system is de-energised and uses the locking cap - T40262- to ensure that the system cannot be re-energised. The ignition key and the maintenance connector for high-voltage system - TW - are then stored in a safe place by the qualified person.
- ◆ The qualified person (Audi high-voltage technician) marks the vehicle by attaching the appropriate warning signs.

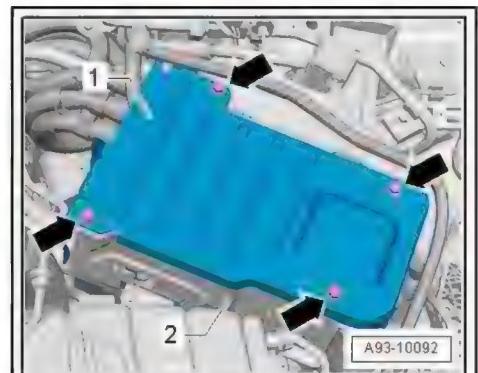


Note

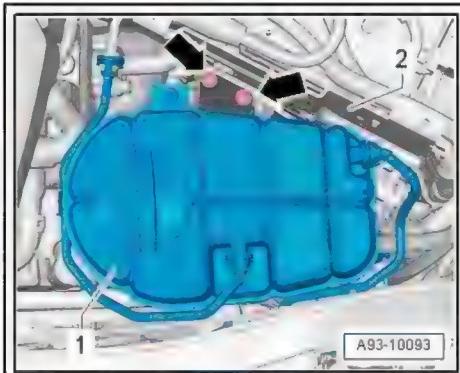
- ◆ De-energising high-voltage system:
- ◆ Connect vehicle diagnostic tester
- ◆ Select Guided Fault Finding mode
- ◆ Using the Go to button, select the following menu options in succession:
- ◆ Function/component selection
- ◆ Body
- ◆ Electrical system
- ◆ Self-diagnosis-compatible systems
- ◆ 8C - Hybrid battery management -J840
- ◆ 8C - Hybrid battery management functions
- ◆ 51 - De-energise high-voltage system (Rep. gr. 93)

- Disconnect 12 V batteries ⇒ Electrical system; Rep. gr. 27 ;
Disconnecting and connecting battery .
- Remove front left headlight ⇒ Electrical system; Rep. gr. 94 ;
Removing and installing headlight housing .
- Remove bolts -arrows- on cover -1- and take cover off power and control electronics for electric drive - JX1- -2-.

Coolant expansion tank is secured on bracket (front) of power and control electronics for electric drive - JX1- .



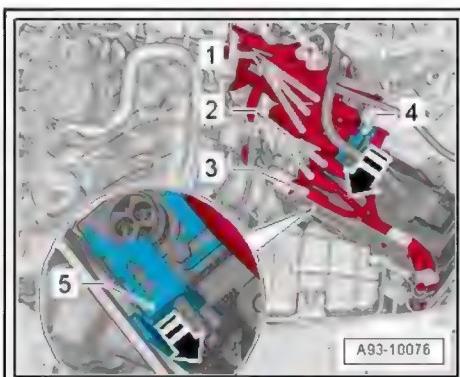
- Remove bolts -arrows- on bracket (front) -2-, swivel coolant expansion tank -1- to one side and secure tank.



- Take care not to damage the red warning label on the power and control electronics for electric drive - JX1- .



- Unplug connectors on power and control electronics for electric drive - JX1- .

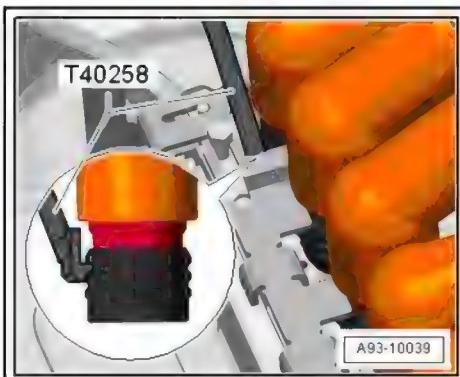


- Push locking mechanism -5- in direction of -arrow- and, starting from the right, release and unplug high-voltage wire for electrical air conditioner compressor - P3- -3- using release tool - T40258- .

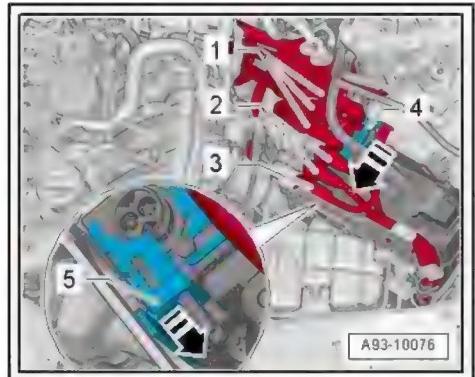


Caution

Only unplug high-voltage connectors by pulling them upwards. Do NOT rotate or tilt them; this could damage the coding on the high-voltage wires.



- Push locking mechanism -4- in direction of -arrow-.



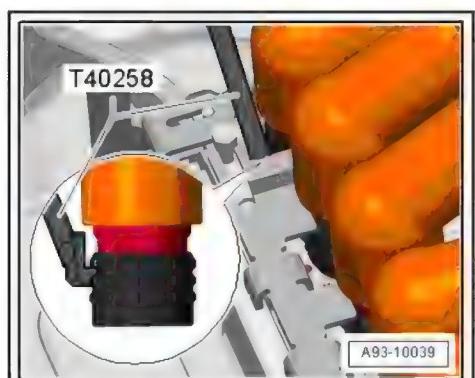
- Starting from left, release and unplug high-voltage wiring harness for hybrid battery - PX1- / high-voltage wiring harness for drive motor - PX2- -1- and -2- using release tool - T40258- .



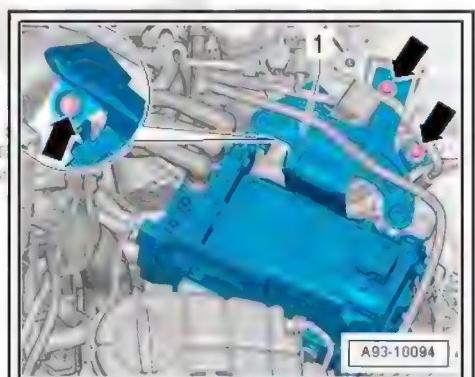
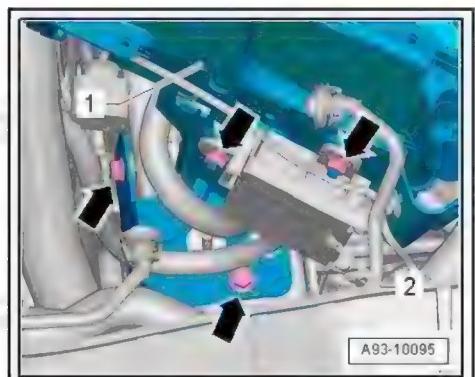
Caution

Only unplug high-voltage connectors by pulling them upwards. Do NOT rotate or tilt them; this could damage the coding on the high-voltage wires.

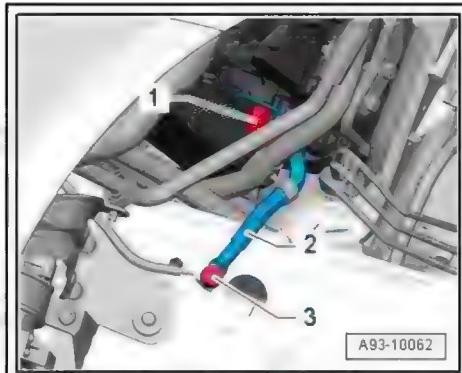
- Place the high-voltage wiring harness for hybrid battery - PX1- -1- and the high-voltage wiring harness for drive motor - PX2- / high-voltage wire for electrical air conditioner compressor - P3- -2- on a cover on the engine.
- Unscrew nuts -arrows- on terminal 30 wiring junction 2 - TV22- -2- and move terminal 30 wiring junction 2 - TV22- -2- to side.
- Remove bolts -arrows- on bracket (front) -1-.



- Remove bolts and nut -arrows- on bracket (rear) -1-.

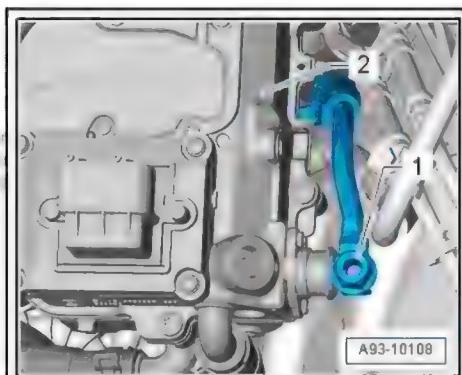


- Unfasten potential equalisation line -2- on body -3-.



- Unscrew securing nut for B+ wire (9 Nm) -1- and pull B+ wire off threaded connection on power and control electronics for electric drive - JX1- -2-.

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- Clamp off both coolant lines -4 and 5- with hose clamps up to 25 mm - 3094- -3 and 6-.
- Open and pull off both hose connectors -2 and 5-.

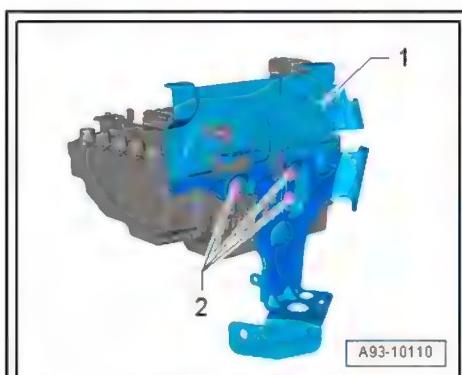
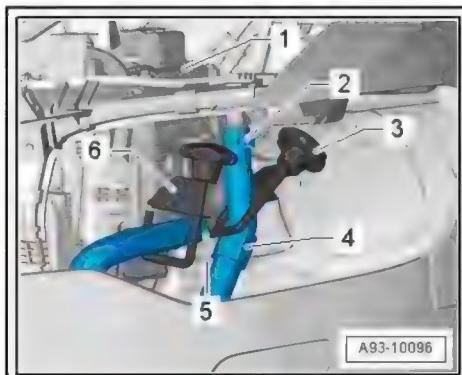


Catch escaping coolant using a suitable container.

- Lift power and control electronics for electric drive - JX1- -1- upwards slightly.
- Disconnect breather hose.
- Lift power and control electronics for electric drive - JX1- upwards out of vehicle.

Removing bracket

- Remove bolts -2- and take bracket (front) -1- off power and control electronics for electric drive - JX1- .



- Remove bolts -2- and take bracket (rear) -1- off power and control electronics for electric drive - JX1- .

Installing

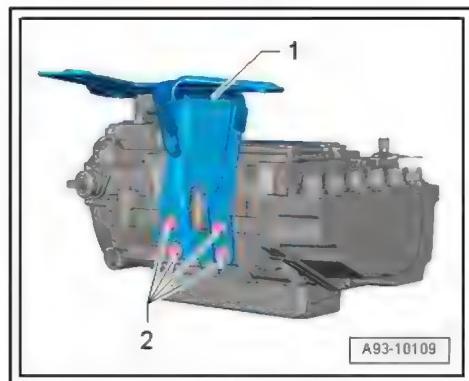
Installation is carried out in reverse sequence; note the following:

Tightening torques [⇒ page 26](#)



WARNING

Pay very careful attention to the coding of the high-voltage wires. Mistakes lead to short circuits and irreparable damage to high-voltage components.



WARNING

Working on vehicles with high-voltage wiring:

- *Do not support yourself or tools on high-voltage wiring or associated components --> this can damage the insulation.*
- *High-voltage wiring must not be excessively bent or kinked --> this can damage the insulation.*
- *The round high-voltage connectors are colour-coded with an external coloured ring and are provided with mechanical coding or guide lugs. It is important to observe this coding when joining up the round high-voltage connectors, otherwise the connectors can be damaged.*



Note

- ◆ *The contact surfaces of the potential equalisation line must be checked prior to installation.*
- ◆ *The contact surfaces must be clean and free from rust and grease.*
- ◆ *Otherwise, repair the contact surfaces using the contact surface cleaning set - VAS 6410- ⇒ Electrical system; General information; Rep. gr. 97 ; Cleaning contact surfaces with contact surface cleaning set - VAS 6410- .*
- Connect high-voltage wires according to their coding
[⇒ page 38](#) .



Note

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- ◆ *High-voltage wires can only be connected and secured in specified sequence.*
- ◆ *Connect and lock high-voltage wire connectors in reverse sequence to removal.*

- Check that the red warning label is present and take care not to damage it.
- Re-energise high-voltage system.

The high-voltage system must be re-energised according to the "Guided Fault Finding" routine in the ⇒ Vehicle diagnostic tester, and ONLY by this method.

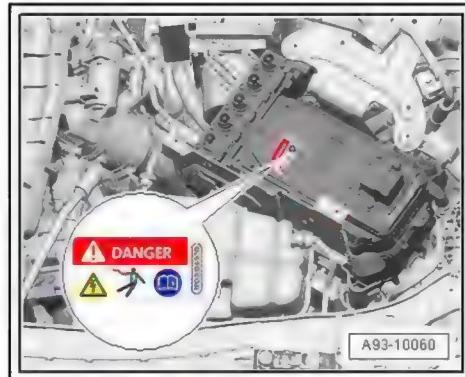


DANGER!

High voltage can cause fatal injury

Danger of severe or fatal injuries from electric shock.

- ◆ The high-voltage system may only be re-energised by a suitably qualified person (Audi high-voltage technician).
- ◆ The system may only be re-energised using the vehicle diagnostic tester via "Guided Fault Finding".
- ◆ The vehicle is then made ready for operation again by the qualified person (Audi high-voltage technician).
- ◆ The qualified person (Audi high-voltage technician) marks the vehicle by attaching the appropriate warning signs.



Note

- ◆ Re-energising high-voltage system:
- ◆ Connect vehicle diagnostic tester
- ◆ Select Guided Fault Finding mode
- ◆ Using the Go to button, select the following menu options in succession:
 - ◆ Function/component selection
 - ◆ Body
 - ◆ Electrical system
 - ◆ Self-diagnosis-compatible systems
 - ◆ 8C – Hybrid battery management -J840
 - ◆ 8C – Hybrid battery management, functions
 - ◆ 51 – Re-energise high-voltage system (Rep. gr. 93)
- Bleed low-temperature cooling circuit ⇒ 4-cylinder direct petrol injection engine (2.0 ltr. 4-valve turbo), mechanics; Rep. gr. 19 .

The following steps must always be performed if power and control electronics for electric drive - JX1- is renewed:

Connect ⇒ Vehicle diagnostic tester.

- Select Guided Fault Finding mode.
- Using the Go to button, select the following menu options in succession:
 - ◆ Function/component selection
 - ◆ Body
 - ◆ Electrical system

- ◆ Self-diagnosis-compatible systems
- ◆ 51 - Electric drive control unit - J841
- ◆ 51 - Electric drive, functions
- ◆ 51 - Basic setting (Rep. gr. 93)

6.4 High-voltage wires

6.4.1 General description



WARNING

Working on vehicles with high-voltage wiring:

- *Do not support yourself or tools on high-voltage wiring or associated components --> this can damage the insulation.*
- *High-voltage wiring must not be excessively bent or kinked --> this can damage the insulation.*
- *The round high-voltage connectors are colour-coded with an external coloured ring and are provided with mechanical coding or guide lugs. It is important to observe this coding when joining up the round high-voltage connectors, otherwise the connectors can be damaged.*

The following high-voltage wires connect the high-voltage components.

High-voltage wiring harness for hybrid battery - PX1- :

Routing from hybrid battery unit - AX1- to power and control electronics for electric drive - JX1- .

Consists of two high-voltage wires:

- ◆ High-voltage wire for hybrid battery, positive terminal - P1-
- ◆ High-voltage wire for hybrid battery, negative terminal - P2-

Removing and installing high-voltage wiring harness for hybrid battery - PX1- [⇒ page 38](#) .

High-voltage wiring harness for drive motor - PX2- :

Routed from power and control electronics for electric drive - JX1- to electric drive motor - V141- .

Consists of three high-voltage wires:

- ◆ High-voltage wire 1 for drive motor - P4-
- ◆ High-voltage wire 2 for drive motor - P5-
- ◆ High-voltage wire 3 for drive motor - P6-

Removing and installing high-voltage wiring harness for drive motor - PX2- [⇒ page 43](#) .

High-voltage wire for electrical air conditioner compressor - P3- :

Routed from power and control electronics for electric drive - JX1- to electrical air conditioner compressor - V470- .

Removing and installing high-voltage wire for electrical air conditioner compressor - P3- [⇒ page 49](#) .



1 - Combustion engine

- ⇒ 4-cylinder direct petrol injection engine (2.0 ltr. 4-valve turbo), mechanics; Rep. gr.

2 - Electric drive motor - V141-

3 - Hybrid battery unit - AX1-

4 - High-voltage wiring harness for hybrid battery - PX1-

- Routing of hybrid battery unit - AX1- to power and control electronics for electric drive - JX1-
- Consists of high-voltage wire for hybrid battery, positive terminal - P1- / high-voltage wire for hybrid battery, negative terminal - P2-
- Removing and installing ⇒ [page 38](#)

5 - High-voltage wiring harness for drive motor - PX2-

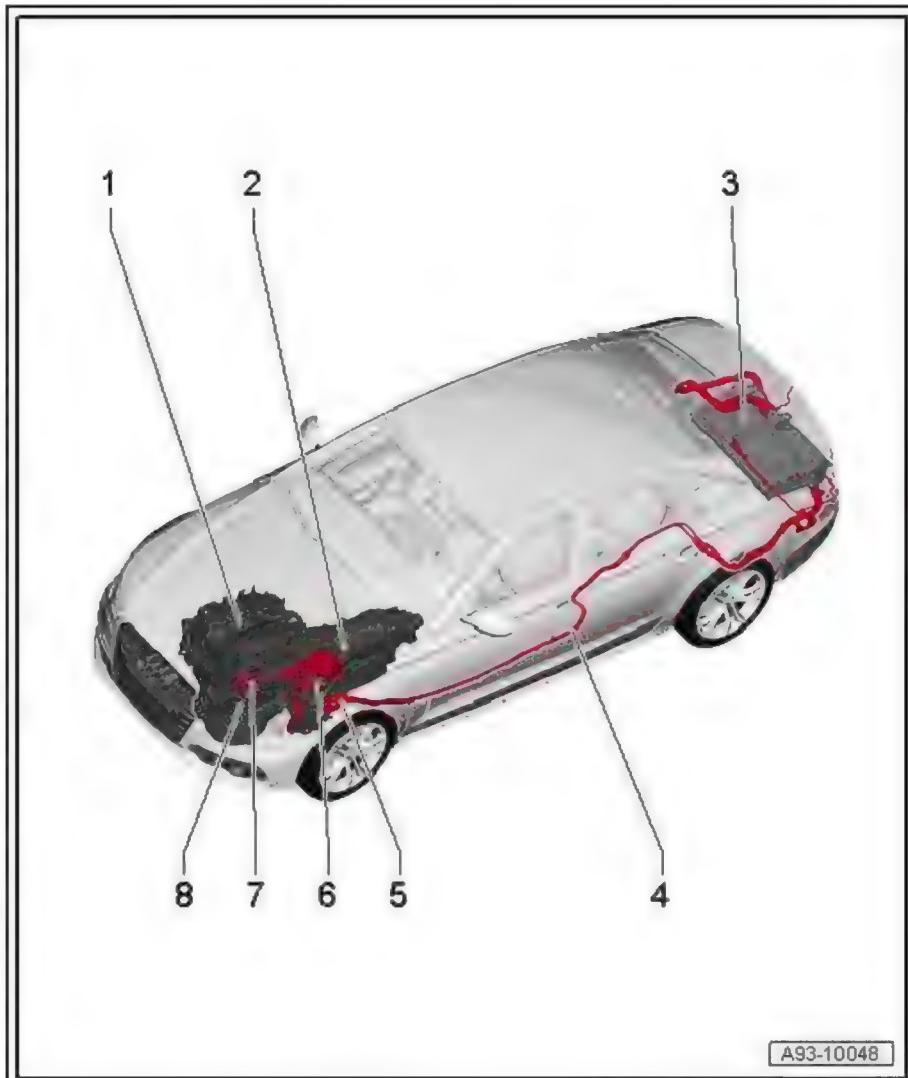
- Routed from power and control electronics for electric drive - JX1- to electric drive motor - V141-
- Consists of high-voltage wire 1 for drive motor - P4- / high-voltage wire 2 for drive motor - P5- / high-voltage wire 3 for drive motor - P6-
- Removing and installing ⇒ [page 43](#)

6 - Power and control electronics for electric drive - JX1-

7 - High-voltage wire for electrical air conditioner compressor - P3-

- Routed from power and control electronics for electric drive - JX1- to electrical air conditioner compressor - V470-
- Removing and installing ⇒ [page 49](#)

8 - Electrical air conditioner compressor - V470-



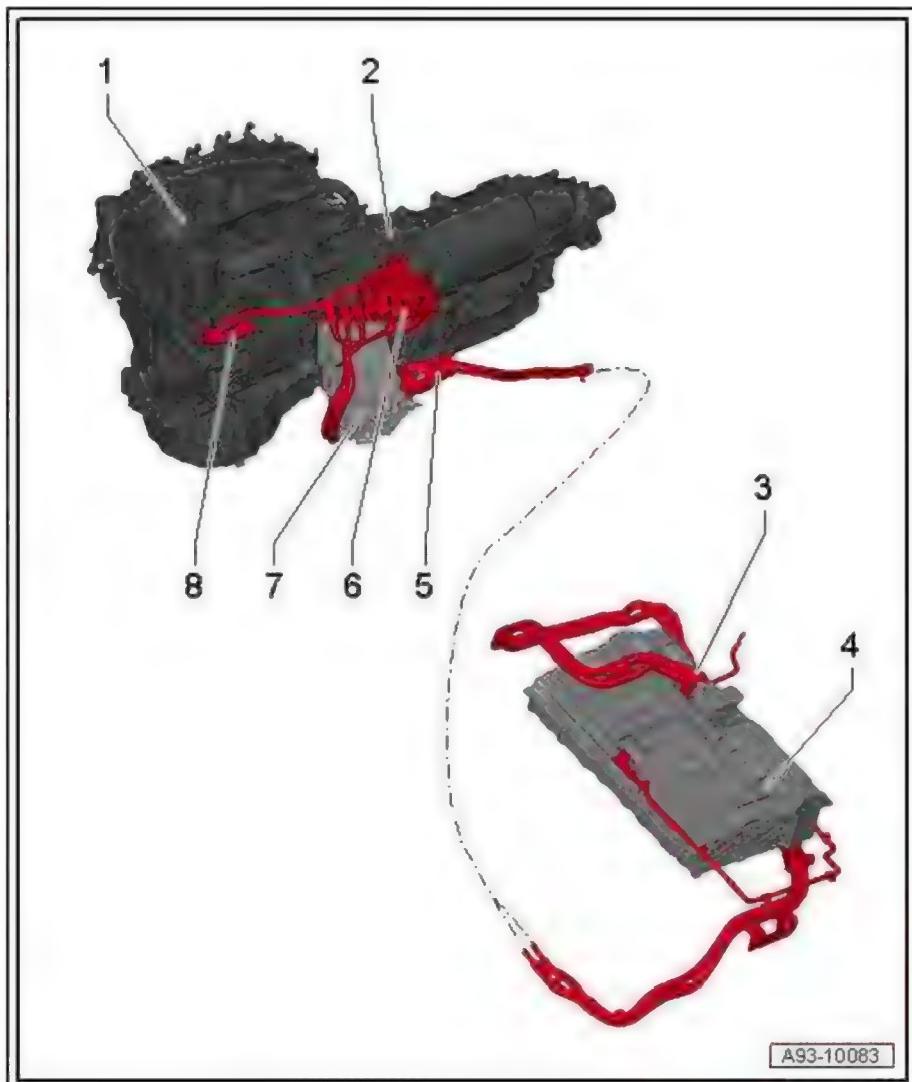
6.4.2 Identification of high-voltage wiring

To avoid confusion, the connections for the high-voltage wires are coded. The connectors have coloured rings and the corresponding connections on the hybrid battery unit - AX1- and the power and control electronics for electric drive - JX1- have a coloured dot. Connections on electric drive motor - V141- have "mechanical coding" (coding lugs).

It is important to observe this coding when joining up and screwing in the high-voltage wires in order to avoid short circuits or damage to the high-voltage wires.

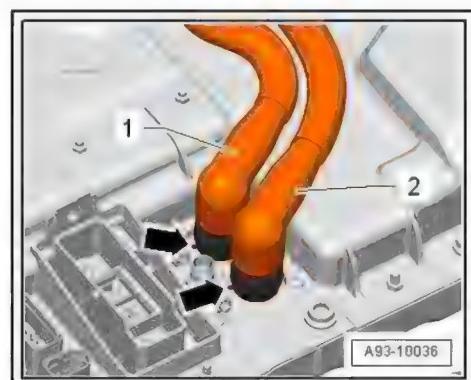
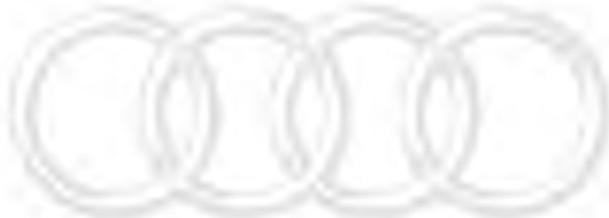
Overview of high-voltage connections

- 1 - Combustion engine
- 2 - Electric drive motor - V141-
- 3 - High-voltage connections on hybrid battery unit - AX1-
 - Coding [⇒ page 37](#)
- 4 - Hybrid battery unit - AX1-
- 5 - High-voltage connections on electric drive motor - V141-
 - Coding [⇒ page 38](#)
- 6 - High-voltage connections on power and control electronics for electric drive - JX1-
 - Coding [⇒ page 38](#)
- 7 - Power and control electronics for electric drive - JX1-
- 8 - Electrical air conditioner compressor - V470- with high-voltage connection



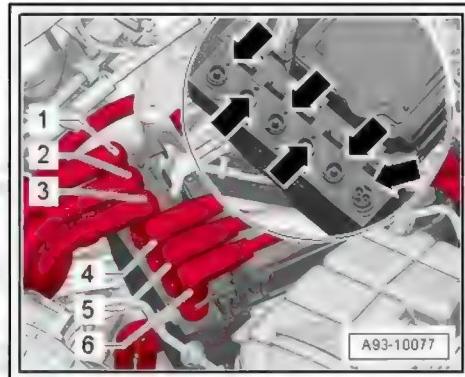
High-voltage connections on hybrid battery unit - AX1-

- 1 - High-voltage connection (-): brown ring and brown dot -arrow-
- 2 - High-voltage connection (+): red ring and red dot -arrow-



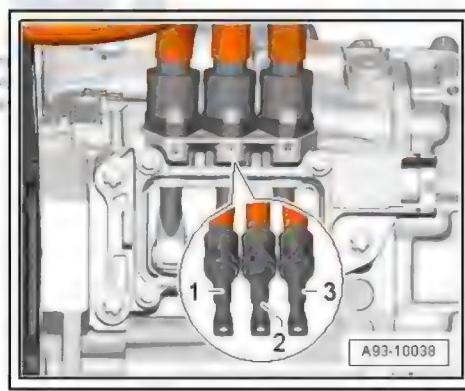
High-voltage connections on power and control electronics for electric drive - JX1-

- 1 - High-voltage connection (U) to electric drive motor - V141- : blue ring and blue dot -arrow-
- 2 - High-voltage connection (V) to electric drive motor - V141- : green ring and green dot -arrow-
- 3 - High-voltage connection (W) to electric drive motor - V141- : violet ring and violet dot -arrow-
- 4 - High-voltage connection (-) from hybrid battery unit - AX1- : brown ring and brown dot -arrow-
- 5 - High-voltage connection (+) from hybrid battery unit - AX1- : red ring and red dot -arrow-
- 6 - High-voltage connection to electrical air conditioner compressor - V470- : red ring and red dot -arrow-



High-voltage connections on electric drive motor - V141-

- 1 - High-voltage connection (U): coding lug on right side
- 2 - High-voltage connection (V): coding lug on left side
- 3 - High-voltage connection (W): two coding lugs



6.4.3 Removing and installing high-voltage wiring harness for hybrid battery - PX1-

The high-voltage wiring harness for hybrid battery - PX1- consists of the following wires:

- ◆ High-voltage wire for hybrid battery, positive terminal - P1- (red coloured ring)
- ◆ High-voltage wire for hybrid battery, negative terminal - P2- (brown coloured ring)



WARNING

Working on vehicles with high-voltage wiring:

- *Do not support yourself or tools on high-voltage wiring or associated components --> this can damage the insulation.*
- *High-voltage wiring must not be excessively bent or kinked --> this can damage the insulation.*
- *The round high-voltage connectors are colour-coded with an external coloured ring and are provided with mechanical coding or guide lugs. It is important to observe this coding when joining up the round high-voltage connectors, otherwise the connectors can be damaged.*

Special tools and workshop equipment required

◆ Torque wrench - V.A.G 1331-

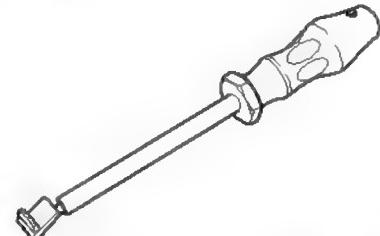
V.A.G 1331



W00-0427

◆ Release tool - T40258-

T40258



W00-10980

Removing

- De-energise high-voltage system.

The high-voltage system must be de-energised according to the "Guided Fault Finding" routine in the ⇒ Vehicle diagnostic tester, and ONLY by this method.



DANGER!

High voltage can cause fatal injury

Danger of severe or fatal injuries from electric shock

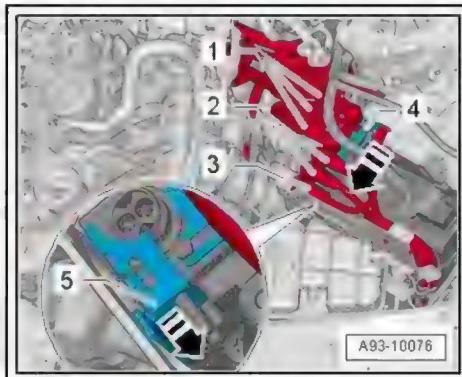
- ◆ The high-voltage system may only be de-energised by a suitably qualified person (Audi high-voltage technician).
- ◆ It must be definitely confirmed that the high-voltage system is de-energised. The system may only be de-energised using the vehicle diagnostic tester via "Guided Fault Finding".
- ◆ The qualified person (Audi high-voltage technician) confirms that the system is de-energised and uses the locking cap - T40262- to ensure that the system cannot be re-energised. The ignition key and the maintenance connector for high-voltage system - TW - are then stored in a safe place by the qualified person.
- ◆ The qualified person (Audi high-voltage technician) marks the vehicle by attaching the appropriate warning signs.

 Note

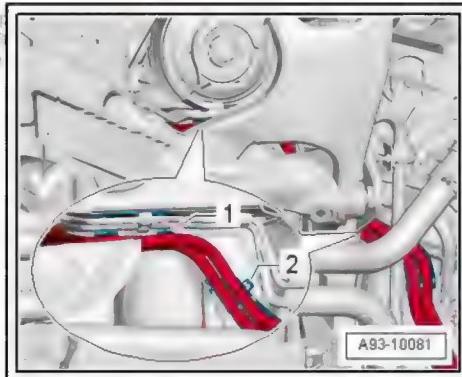
- ◆ *De-energising high-voltage system:*
- ◆ *Connect vehicle diagnostic tester*
- ◆ *Select Guided Fault Finding mode*
- ◆ *Using the [Go to] button, select the following menu options in succession:*
- ◆ ***[Function/component selection]***
- ◆ ***[Body]***
- ◆ ***[Electrical system]***
- ◆ ***[Self-diagnosis-compatible systems]***
- ◆ ***[8C – Hybrid battery management -J840]***
- ◆ ***[8C – Hybrid battery management, functions]***
- ◆ ***[51 – De-energise high-voltage system (Rep. gr. 93)]***

High-voltage wiring harness for hybrid battery - PX1- is located on left of vehicle underside.

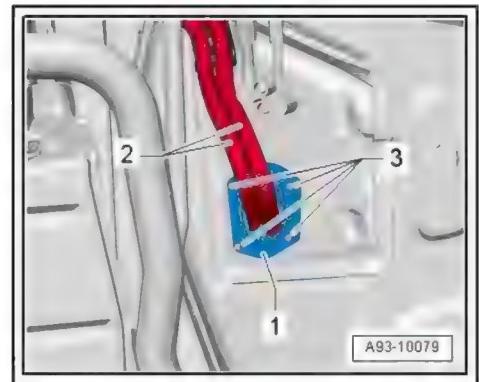
- Remove hybrid battery unit - AX1- [⇒ page 19](#) .
- Remove front noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Removing and installing front noise insulation .
- Remove rear noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Removing and installing rear noise insulation .
- Remove underbody cover ⇒ General body repairs, exterior; Rep. gr. 66 ; Exploded view - covers .
- Disconnect high-voltage wiring harness for hybrid battery - PX1- -2- from power and control electronics for electric drive - JX1- [⇒ page 27](#) .
- Guide high-voltage wiring harness for hybrid battery - PX1- downwards out of engine compartment.



- Cut through cable ties towards rear until wire guides -1- and -2- are reached and unclip high-voltage wiring harness.
- Remove wiring guides -1- to -2- (1.5 Nm).



- Unscrew nuts -3- (1.5 Nm) on leadthrough -1-.



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- Remove wiring guide -2- (1.5 Nm) and cut though cable ties -arrows-.
- Unclip leadthrough -3- and guide downwards through body floor.
- Guide high-voltage wiring harness for hybrid battery - PX1-1- through opening in body floor and take out of vehicle downwards.

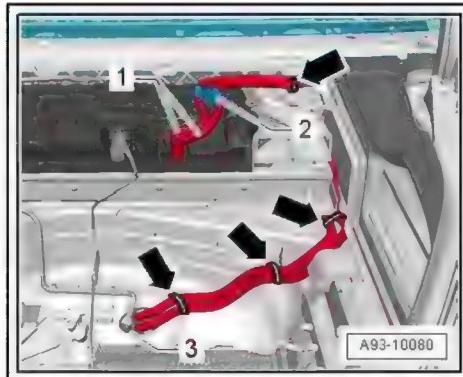
Installing

Installation is carried out in reverse sequence; note the following:



WARNING

Pay very careful attention to the coding of the high-voltage wires. Mistakes lead to short circuits and irreparable damage to high-voltage components.



Note

- ◆ All cable ties which have been released or cut through during removal must be re-attached in the same position on installation.
- ◆ Tighten all screw connections to the tightening torques specified.
- ◆ When installing leadthrough in luggage compartment floor, make sure that it engages and seals securely.



WARNING

Working on vehicles with high-voltage wiring:

- Do not support yourself or tools on high-voltage wiring or associated components --> this can damage the insulation.
- High-voltage wiring must not be excessively bent or kinked --> this can damage the insulation.
- The round high-voltage connectors are colour-coded with an external coloured ring and are provided with mechanical coding or guide lugs. It is important to observe this coding when joining up the round high-voltage connectors, otherwise the connectors can be damaged.

- ◆ Coding of high-voltage connectors on hybrid battery unit - AX1- [⇒ page 37](#)
- ◆ Coding of high-voltage connectors on power and control electronics for electric drive - JX1- [⇒ page 38](#)
- Re-energise high-voltage system.

The high-voltage system must be re-energised according to the "Guided Fault Finding" routine in the ⇒ Vehicle diagnostic tester, and ONLY by this method.

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DANGER!

High voltage can cause fatal injury

Danger of severe or fatal injuries from electric shock.

- ◆ *The high-voltage system may only be re-energised by a suitably qualified person (Audi high-voltage technician).*
- ◆ *The system may only be re-energised using the vehicle diagnostic tester via "Guided Fault Finding".*
- ◆ *The vehicle is then made ready for operation again by the qualified person (Audi high-voltage technician).*
- ◆ *The qualified person (Audi high-voltage technician) marks the vehicle by attaching the appropriate warning signs.*



Note

- ◆ *Re-energising high-voltage system:*
- ◆ *Connect vehicle diagnostic tester*
- ◆ *Select Guided Fault Finding mode*
- ◆ *Using the Go to button, select the following menu options in succession:*
- ◆ **Function/component selection**
- ◆ **Body**
- ◆ **Electrical system**
- ◆ **Self-diagnosis-compatible systems**
- ◆ **8C - Hybrid battery management -J840**
- ◆ **8C - Hybrid battery management, functions**
- ◆ **51 - Re-energise high-voltage system (Rep. gr. 93)**

6.4.4 Removing and installing high-voltage wiring harness for drive motor - PX2-

The high-voltage wiring harness for drive motor - PX2- consists of the following wires:

- ◆ High-voltage wire 1 for drive motor - P4- (U)
- ◆ High-voltage wire 2 for drive motor - P5- (V)
- ◆ High-voltage wire 3 for drive motor - P6- (W)

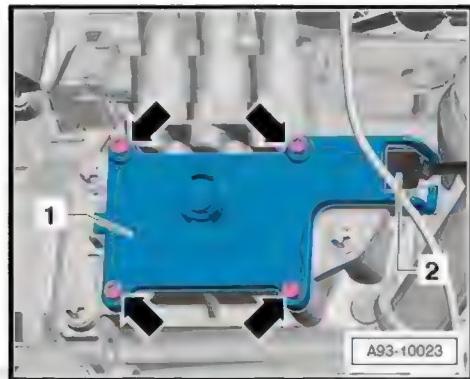
High-voltage wiring harness for drive motor - PX2- is connected to electric drive motor - V141- in a sealed connection box -1-.



WARNING

Working on vehicles with high-voltage wiring:

- *Do not support yourself or tools on high-voltage wiring or associated components --> this can damage the insulation.*
- *High-voltage wiring must not be excessively bent or kinked --> this can damage the insulation.*
- *The round high-voltage connectors are colour-coded with an external coloured ring and are provided with mechanical coding or guide lugs. It is important to observe this coding when joining up the round high-voltage connectors, otherwise the connectors can be damaged.*



Special tools and workshop equipment required

- ◆ Torque wrench - V.A.G 1331-

V.A.G 1331

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W00-0427

Removing

- De-energise high-voltage system.

The high-voltage system must be de-energised according to the "Guided Fault Finding" routine in the ⇒ Vehicle diagnostic tester, and ONLY by this method.



DANGER!

High voltage can cause fatal injury

Danger of severe or fatal injuries from electric shock

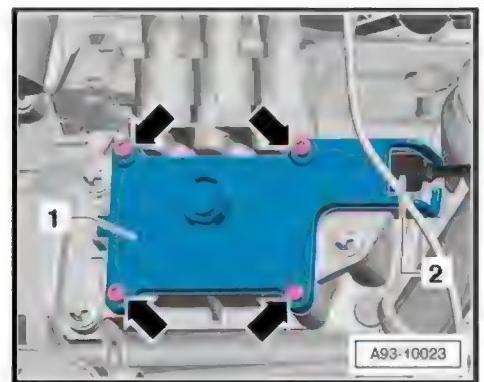
- ◆ The high-voltage system may only be de-energised by a suitably qualified person (Audi high-voltage technician).
- ◆ It must be definitely confirmed that the high-voltage system is de-energised. The system may only be de-energised using the vehicle diagnostic tester via "Guided Fault Finding".
- ◆ The qualified person (Audi high-voltage technician) confirms that the system is de-energised and uses the locking cap - T40262- to ensure that the system cannot be re-energised. The ignition key and the maintenance connector for high-voltage system - TW - are then stored in a safe place by the qualified person.
- ◆ The qualified person (Audi high-voltage technician) marks the vehicle by attaching the appropriate warning signs.

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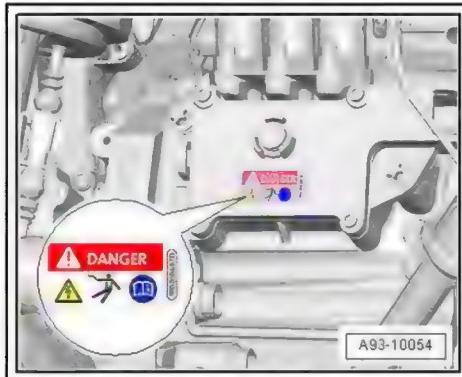


Note

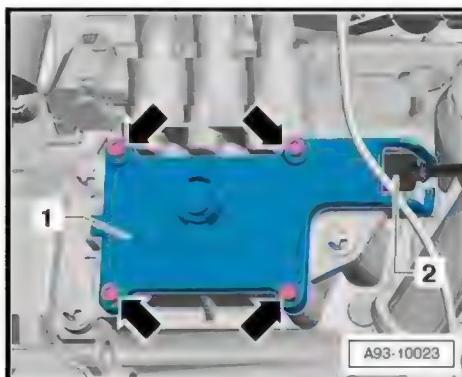
- ◆ De-energising high-voltage system:
- ◆ Connect vehicle diagnostic tester
- ◆ Select **Guided Fault Finding** mode
- ◆ Using the **Go to** button, select the following menu options in succession:
 - ◆ **Function/component selection**
 - ◆ **Body**
 - ◆ **Electrical system**
 - ◆ **Self-diagnosis-compatible systems**
 - ◆ **8C - Hybrid battery management -J840**
 - ◆ **8C - Hybrid battery management, functions**
 - ◆ **51 - De-energise high-voltage system (Rep. gr. 93)**
- Unplug connector -2-.



- Ensure that the red warning label is not damaged.



- Remove bolts -arrows- (9 Nm) and remove cover -1- from connection box.

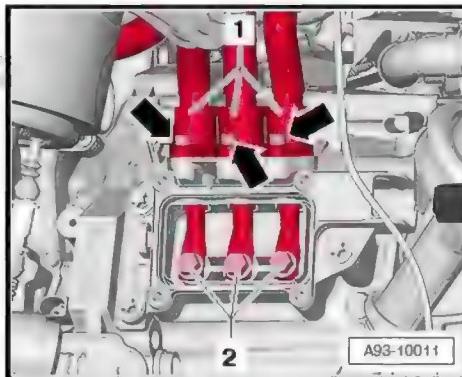


- Remove bolts -2- (20 Nm) for high-voltage wires.
- Remove bolts -arrows- (9 Nm) for wiring retainers -1-.
- Pull high-voltage wires -1- upwards out of connection box one by one.



Caution

Only pull off high-voltage wires upwards. Do NOT rotate or tilt them; this could damage the coding on the high-voltage wires.



Installing

Installation is carried out in reverse sequence; note the following:



WARNING

Pay very careful attention to the coding of the high-voltage wires. Mistakes lead to short circuits and irreparable damage to high-voltage components.

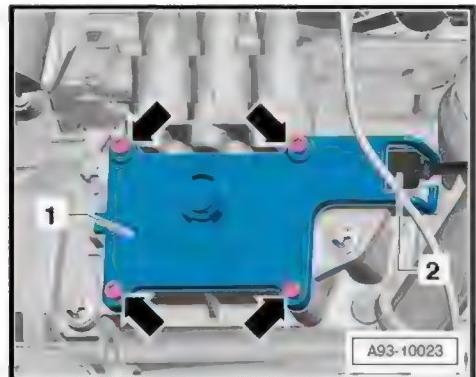
The connector -2- must only be plugged in after the cover has been fully fitted.

Connector -2-



Note

- ◆ All cable ties which have been released or cut through during removal must be re-attached in the same position on installation.
- ◆ Tighten all screw connections to the tightening torques specified.
- ◆ When installing leadthrough in luggage compartment floor, make sure that it engages and seals securely.



A93-10023



WARNING

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- Do not support yourself or tools on high-voltage wiring or associated components --> this can damage the insulation.
- High-voltage wiring must not be excessively bent or kinked --> this can damage the insulation.
- The round high-voltage connectors are colour-coded with an external coloured ring and are provided with mechanical coding or guide lugs. It is important to observe this coding when joining up the round high-voltage connectors, otherwise the connectors can be damaged.

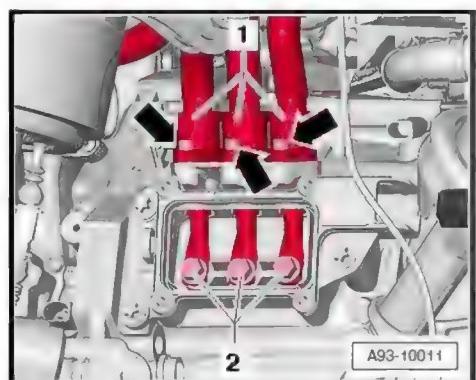
- ◆ Coding of high-voltage connectors on electric drive motor - V141- [⇒ page 38](#)

- Tighten bolts -arrows- on wiring retainers to 9 Nm.
- Tighten bolts -2- for high-voltage wiring to 20 Nm.



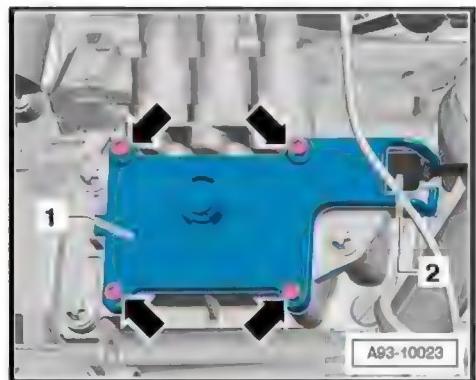
Note

The seal on the connection box cover must be renewed after opening.



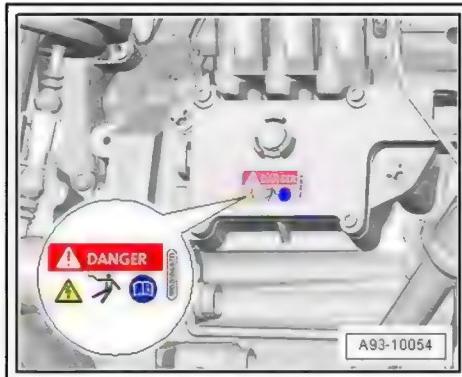
A93-10011

- After renewing seal on connection box cover, place cover on connection box and tighten bolts -1- to 9 Nm.



A93-10023

- Check that the red warning label is present and take care not to damage it.



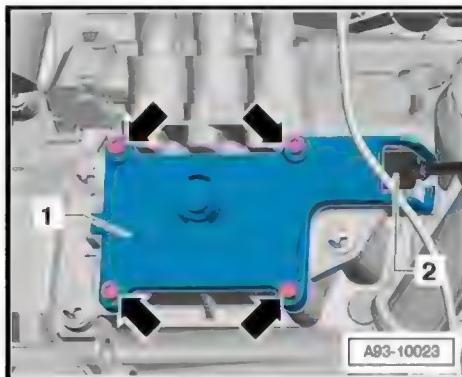
- Plug in connector -2-.
- Re-energise high-voltage system.

The high-voltage system must be re-energised according to the "Guided Fault Finding" routine in the ⇒ Vehicle diagnostic tester, and ONLY by this method.

 **DANGER!**

High voltage can cause fatal injury
Danger of severe or fatal injuries from electric shock.

- ◆ *The high-voltage system may only be re-energised by a suitably qualified person (Audi high-voltage technician).*
- ◆ *The system may only be re-energised using the vehicle diagnostic tester via "Guided Fault Finding".*
- ◆ *The vehicle is then made ready for operation again by the qualified person (Audi high-voltage technician).*
- ◆ *The qualified person (Audi high-voltage technician) marks the vehicle by attaching the appropriate warning signs.*



 Note

- ◆ **Re-energising high-voltage system:**
- ◆ **Connect vehicle diagnostic tester**
- ◆ **Select Guided Fault Finding mode**
- ◆ **Using the Go to button, select the following menu options in succession:**
 - ◆ **Function/component selection**
 - ◆ **Body**
 - ◆ **Electrical system**
 - ◆ **Self-diagnosis-compatible systems**
 - ◆ **8C - Hybrid battery management -J840**
 - ◆ **8C - Hybrid battery management, functions**
 - ◆ **51 - Re-energise high-voltage system (Rep. gr. 93)**

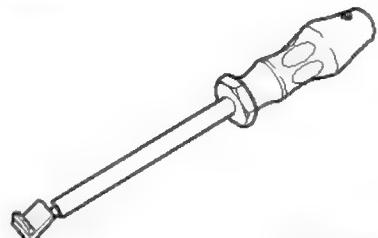
6.4.5 Removing and installing high-voltage wire for electrical air conditioner compressor - P3-

Special tools and workshop equipment required

- ◆ Release tool - T40258-

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T40258



W00-10980



WARNING

Working on vehicles with high-voltage wiring:

- *Do not support yourself or tools on high-voltage wiring or associated components —> this can damage the insulation.*
- *High-voltage wiring must not be excessively bent or kinked —> this can damage the insulation.*
- *The round high-voltage connectors are colour-coded with an external coloured ring and are provided with mechanical coding or guide lugs. It is important to observe this coding when joining up the round high-voltage connectors, otherwise the connectors can be damaged.*

Removing

- De-energise high-voltage system.

The high-voltage system must be de-energised according to the "Guided Fault Finding" routine in the ⇒ Vehicle diagnostic tester, and ONLY by this method.



DANGER!

High voltage can cause fatal injury

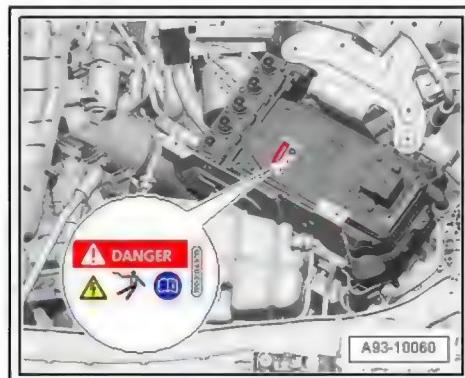
Danger of severe or fatal injuries from electric shock

- ◆ *The high-voltage system may only be de-energised by a suitably qualified person (Audi high-voltage technician).*
- ◆ *It must be definitely confirmed that the high-voltage system is de-energised. The system may only be de-energised using the vehicle diagnostic tester via "Guided Fault Finding".*
- ◆ *The qualified person (Audi high-voltage technician) confirms that the system is de-energised and uses the locking cap - T40262- to ensure that the system cannot be re-energised. The ignition key and the maintenance connector for high-voltage system - TW - are then stored in a safe place by the qualified person.*
- ◆ *The qualified person (Audi high-voltage technician) marks the vehicle by attaching the appropriate warning signs.*

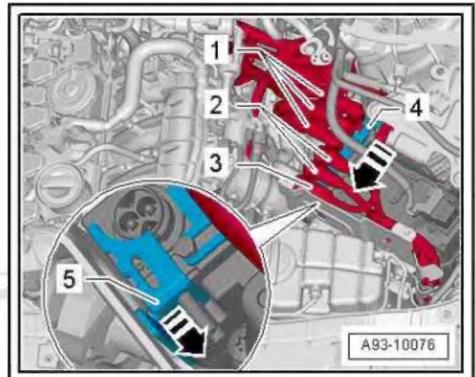


Note

- ◆ *De-energising high-voltage system:*
 - ◆ *Connect vehicle diagnostic tester*
 - ◆ *Select Guided Fault Finding mode*
 - ◆ *Using the [Go to] button, select the following menu options in succession:*
 - ◆ **Function/component selection**
Procedure: Select the function component menu and select the menu item which is not present in the menu. This is done by pressing the [OK] button. The menu item is then highlighted and can be selected by pressing the [OK] button again. The menu item is then highlighted and can be selected by pressing the [OK] button again.
 - ◆ **Body**
 - ◆ **Electrical system**
 - ◆ **Self-diagnosis-compatible systems**
 - ◆ **8C – Hybrid battery management -J840**
 - ◆ **8C – Hybrid battery management, functions**
 - ◆ **51 – De-energise high-voltage system (Rep. gr. 93)**
- Check that the red warning label is present and take care not to damage it.



- Pull catch -5- in direction of -arrow-.



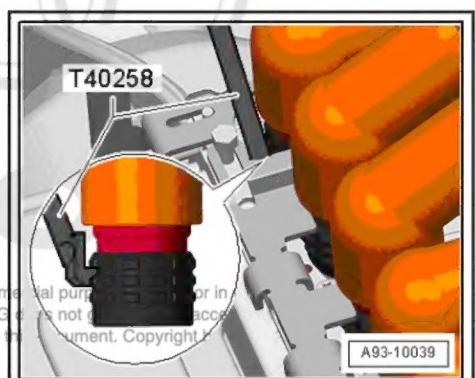
- Starting from the right, release high-voltage wire for electrical air conditioner compressor - P3- -3- on power and control electronics for electric drive - JX1- using release tool - T40258- and pull off.



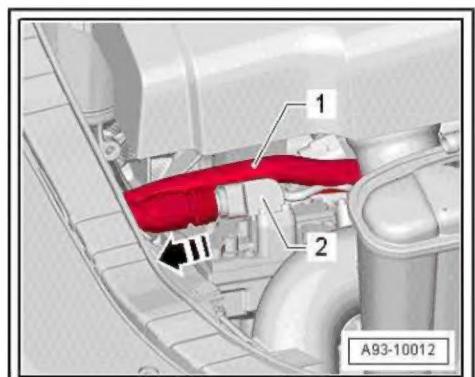
Caution

*Only unplug high-voltage connectors by pulling them upwards.
Do NOT rotate or tilt them; this could damage the coding on
the high-voltage wires.*

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- Release and unplug high-voltage wire for electrical air conditioner compressor - P3- -1- on electrical air conditioner compressor - V470- -2- in direction of -arrow- using release tool - T40258- .



- Check that the red warning label is present and take care not to damage it.
- Remove high-voltage wire for electrical air conditioner compressor - P3- upwards out of vehicle after loosening wiring clips.

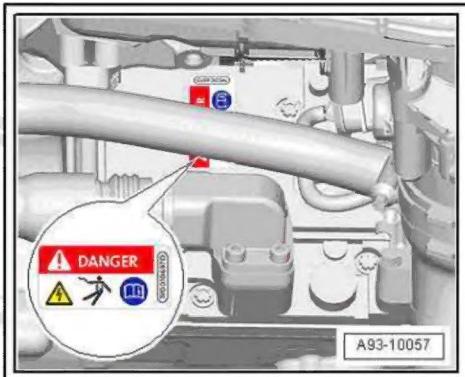
Installing

Installation is carried out in reverse sequence; note the following:



WARNING

Pay very careful attention to the coding of the high-voltage wires. Mistakes lead to short circuits and irreparable damage to high-voltage components.



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- ◆ All cable ties which have been released or cut through during removal must be re-attached in the same position on installation.
- ◆ Tighten all screw connections to the tightening torques specified.
- ◆ When installing leadthrough in luggage compartment floor, make sure that it engages and seals securely.



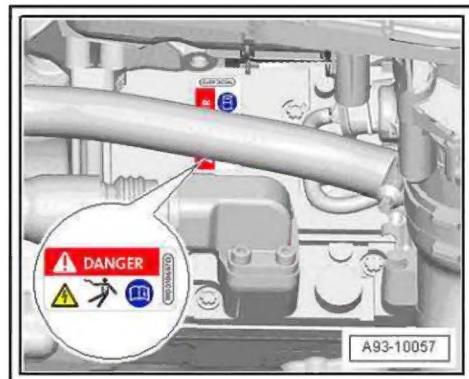
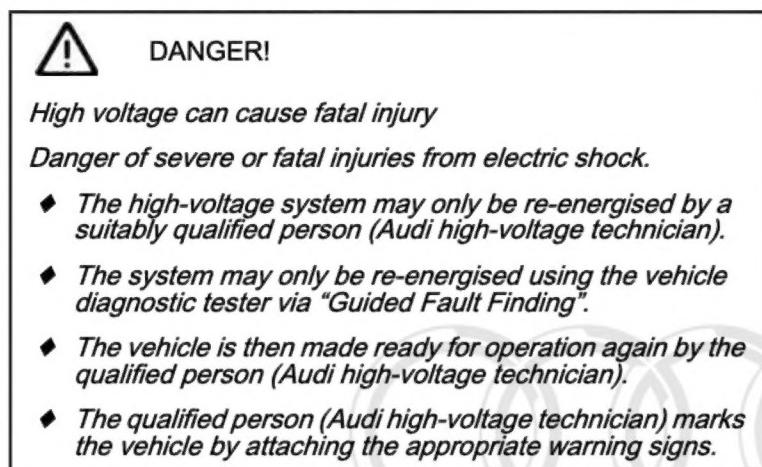
WARNING

Working on vehicles with high-voltage wiring:

- Do not support yourself or tools on high-voltage wiring or associated components --> this can damage the insulation.
 - High-voltage wiring must not be excessively bent or kinked --> this can damage the insulation.
 - The round high-voltage connectors are colour-coded with an external coloured ring and are provided with mechanical coding or guide lugs. It is important to observe this coding when joining up the round high-voltage connectors, otherwise the connectors can be damaged.
- ◆ Coding of high-voltage connectors on power and control electronics for electric drive - JX1- [page 38](#)

- Ensure that the red warning label is not damaged.
- Re-energise high-voltage system.

The high-voltage system must be re-energised according to the "Guided Fault Finding" routine in the ⇒ Vehicle diagnostic tester, and ONLY by this method.



Note

- ◆ *Re-energising high-voltage system:*
- ◆ *Connect vehicle diagnostic tester*
- ◆ *Select Guided Fault Finding mode*
- ◆ *Using the Go to button, select the following menu options in succession:*
- ◆ *Function/component selection*
- ◆ *Body*
- ◆ *Electrical system*
- ◆ *Self-diagnosis-compatible systems*
- ◆ *8C – Hybrid battery management –J840*
- ◆ *8C – Hybrid battery management, functions*
- ◆ *51 – Re-energise high-voltage system (Rep. gr. 93)*

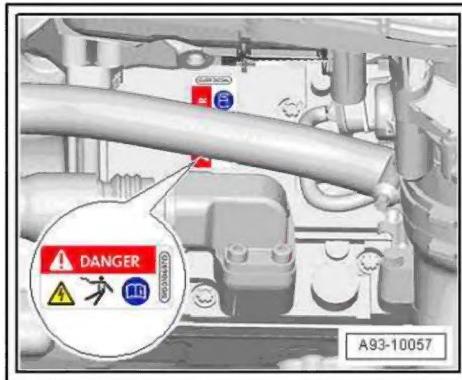
6.5 Electrical air conditioner compressor - V470-

The electrical air conditioner compressor - V470- is installed on the front left in the engine compartment and ensures a comfortable interior temperature even when the combustion engine is switched off, as it is operated electrically. Electrical air conditioner compressor - V470- includes the control unit for air conditioning compressor - J842- .

Removing and installing electrical air conditioner compressor - V470- ⇒ Air conditioning system; Rep. gr. 87 .

- Ensure that the red warning label is not damaged.

Potential equalisation line for electrical air conditioner compressor - V470- [⇒ page 11](#) .



6.6 Brake servo vacuum pump - V469-

The brake servo vacuum pump - V469- is installed on the front right of the engine. It is operated electrically, and ensures the required braking assistance when driving electrically with the combustion engine switched off.

Removing and installing brake servo vacuum pump - V469- ⇒
Brake system; Rep. gr. 47 .

6.7 Cooling system for high-voltage vehicles



WARNING

Hot steam/hot coolant can escape - risk of scalding.

The cooling system is under pressure when the engine is hot.

Cover cap for coolant expansion tank with a cloth and open carefully to release pressure.

Additional cooling system components are installed in vehicles with high-voltage technology to cool high-voltage components and ensure the function of the cooling system even during purely electric driving with the combustion engine switched off.

- ◆ Coolant pump for high-temperature circuit - V467-
- ◆ Coolant pump for low-temperature circuit - V468-

Removing and installing cooling system components ⇒ 4-cylinder direct petrol injection engine (2.0 ltr. 4-valve turbo), mechanics; Rep. gr. 19 .



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